

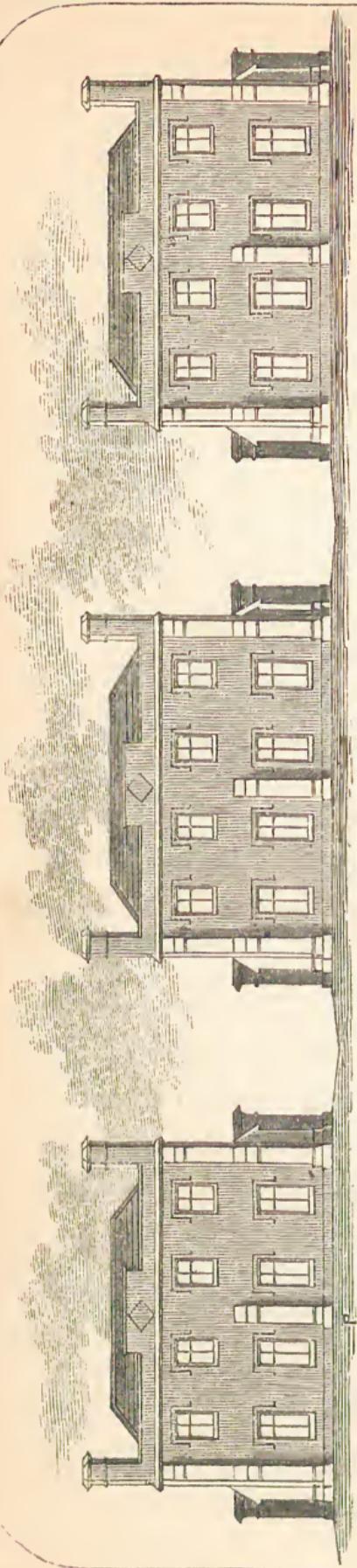
L H Moon
& Son
Bookbinders



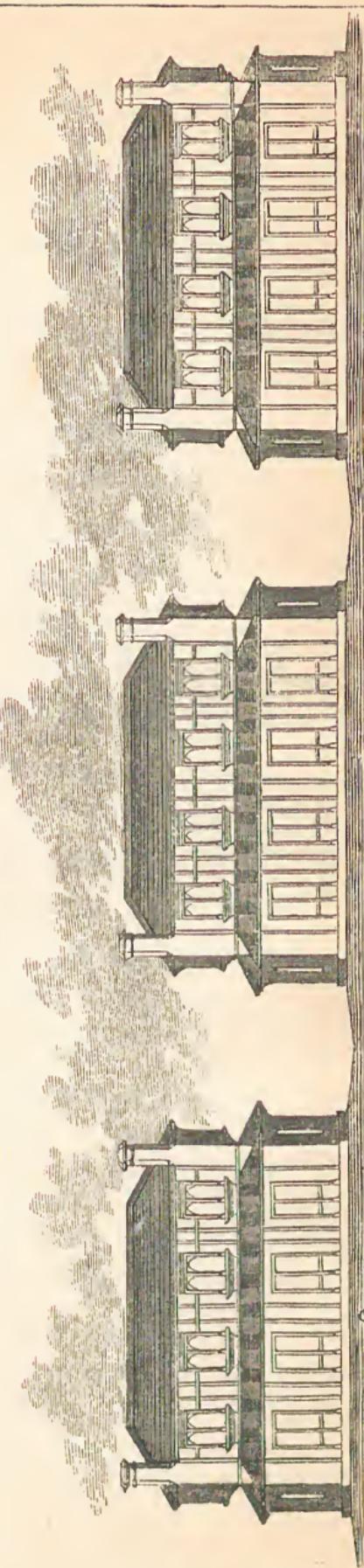
941

3.

5.



10 20 30 40



RUDIMENTARY TREATISE

ON

COTTAGE BUILDING:

OR,

HINTS FOR IMPROVING THE DWELLINGS

OF THE

LABOURING CLASSES.

“My leading doctrine is, that to make these poor people *better*, it is necessary to make them more *comfortable*.”—FELLENBERG, OF HOFWYL.

BY

C. BRUCE ALLEN, ARCHITECT.

SECOND EDITION,

WITH AN APPENDIX,

CONTAINING DESIGNS ALSO FOR A HIGHER CLASS.

London:

JOHN WEALE, 59, HIGH HOLBORN.

1854.

HUGHES, PRINTER,
KING'S HEAD COURT, GOUGH SQUARE.

ADVERTISEMENT.

THE first edition of this little work has been some time out of print, having been sold to the extent of 7000 copies: I am therefore encouraged to issue a second edition, with such additions as will, it is presumed, enhance the value of the work, by new designs and specifications, one of which, 'On the Economy of Rural Dwellings for Tradesmen and Persons of Limited Incomes,' with special illustrations, will interest classes that hitherto have been overlooked. Persons of small capital may find a profitable investment by directing their attention to the object set forth.

JOHN WEALE.

December 1, 1853.

THE public generally, and more particularly young persons who desire to practise Art for its use and profit, are directed to a Rudimentary Volume (to be priced 1*s.*), now in the press, 'On the Art of Photography,' by Dr. Halleur, of Berlin, who has, under the patronage of Baron Von Humboldt, assigned into Mr. Weale's hands a work which he has recently perfected, on the Art of Pictorially Copying and Pourtraying Animated Nature, Landscapes, Objects of Art, &c., by simple means, which this book will fully explain, and enable unpractised persons to take portraits or sketches of various objects. The necessary Apparatus, of a superior manufacture, will be imported from Berlin.

December 1, 1853.

CONTENTS.

CHAPTER I.

CHAPTER II.

Hints on the Construction of Cottages for the Labouring Poor: Site and Position—Drainage, and Supply of Water—Walls—Floors—Roofs—Ventilation and Warming 21-54

PLATES I. to XXVI.—Plans, Elevations, Sections, &c.	55-86
Estimate of Cost .	87
Specification of Works to be done in the Erection of Cottages	88-94

APPENDIX:

Plan for a Labourer's Cottage, with Illustrations	95-97
Specification	98-100
Economy of Rural Dwellings for Tradesmen and Persons of limited Incomes, with eleven Illustrations	101-116
Descriptive Specification, with References to the letters on the Plans, 117-123	

COTTAGES FOR THE LABOURING POOR.

CHAPTER I.

INTRODUCTION.

Society is not only disfigured but endangered by the Poverty and Ignorance and Vice of a multitude of its members; and its *security* and *happiness* demand nothing so imperiously as that this wretched mass should be enlightened, elevated, redeemed.

A LATE eminent divine, speaking of the present age, says—“The physical sufferings of the poor are not their chief evils. The great calamity of the poor is not their poverty, but the tendency of their privations and of their social rank to degradation of mind. Give them the Christian spirit, and they would find in their lot the chief elements of good:” for example, —The domestic affections may and do grow up among the poor, and these are to all the chief springs of earthly happiness. Books, too, find their way into every house, however mean; and especially that book which contains more nutriment for the intellect, imagination, and heart, than all others—the Bible: and among the poor are those who find in that one book more enjoyment, more awakening truth, more lofty and beautiful imagery, and more culture to the whole soul, than thousands of the educated find in their general studies, and vastly more than millions in that superficial transitory litera-

ture which consumes all their reading hours. Even the pleasures of a refined taste are not denied to the poor, but might be easily opened to them by a wise culture. True, their rooms are not lined with works of Art, but the living beauty of Nature opens on the eyes of all her children ; and nothing is wanting to the poor man, in his ordinary walks, but a more spiritual eye to discern a beauty which has never yet been embodied in the most inspired works of sculpture or painting.

But the condition of the poor is, without doubt, unfriendly to mental culture and progress. Confined to a monotonous routine of daily toil, there can be little to rouse in them either thought or feeling ; and the hope of a better lot, which rouses and stirs up in other men so much intense thought and action, is apt too soon to fade from their minds. Their condition, too, exerts a most baneful influence on the domestic affections. A family crowded into a single and narrow apartment, which is at once living-room, kitchen, bedroom, nursery, and often hospital, must, without great firmness and self-respect, be wanting in neatness, order, and comfort. *The want of an orderly and comfortable home is among the chief evils of the poor.*

Another unhappy influence exerted on the poor is their living in the sight and in the midst of innumerable comforts and luxuries, which are far above their reach. From this flows their envy and discontent, and, in a measure, their crimes, justified to their own minds by what seems to them the unjust and cruel inequalities of social life.

And from this flows another and fearful trial of the poor, —that while so much is denied them, there is placed within their reach many sinful and debasing gratifications. The same thirst for enjoyment and excitement which drives the rich and prosperous from their pleasant homes to scenes of novelty and stirring amusement, drives the poor to where they can forget for a time the wearying realities of life; for in every poor man's neighbourhood there flows a Lethean stream, which first

affords him pleasureable excitement, and then buries him for awhile in oblivion of all his humiliations and sorrows.*

The civilization of the present age multiplies gratifications and allurements without awakening proportionate moral powers to withstand them.

These are some of the evils of poverty,—a condition which offers many and peculiar obstructions to the development of intellect and right feeling. It is for the benevolent and wealthy to help to remove them : the poor can do but little for themselves without assistance,—and surely, ignorant and sorely tempted as they are, they have solemn claims for aid which they have never yet received.

But what are the means commonly used to relieve the wants and distresses of the poor? They are the support of charitable institutions (whose amount of good must, from their comparative fewness, be limited) and alms-giving. When these means fail, or when the wealthy find their gifts afford no permanent relief, but only call for a renewal of the gift, the unfortunate sufferer is left to descend to the lowest state of human degradation and dependency,—the parish workhouse.

That Christianity should have now been in the world for more than eighteen centuries, and that in the most Christian and highly civilized country of the globe *one-tenth* part of the population should be unable to provide for their individual existence, is a fearful subject of consideration ; and the more so when it is seen that the lower animals are never found in this state, but appear to enjoy existence, each one as far as its powers permit, and to provide for itself in the most perfect way. And the question arises, why have all men been endowed with

* This, the great reason of *intemperance*, founded as it is in the very constitution of human nature, is, as far as the *cause* is concerned, both right and proper : it is the misdirection of noble qualities, and shows that the benevolent efforts of those who are so active in the Temperance Movement can have but a very limited effect till more innocent and legitimate excitement is provided for those who are the objects of their praiseworthy exertions.

faculties so much higher, if a few only of the race are to profit by them? If the creatures of instinct enjoy, as all must see they do, all the happiness of which their nature is susceptible, how much greater should be the happiness of reasonable and accountable beings, even on earth? But the reverse is continually and mournfully seen, and is only to be accounted for by the fact, that the feelings and instincts of men require to be directed by enlightened intellect, and that consequently the present wretched and hopeless state of the greater portion of mankind, even in civilized communities, is the natural punishment ordained by Providence for their continued neglect of the means given them for their improvement and progress.

What a painful thought it is that so much of intellectual and moral worth should exist in a state so degrading and useless,—the charitable institution or the workhouse!—while the wealth of the supporters seems only like the liberality of the monasteries, to increase the evil it is meant to alleviate. But so sacred is nature, that it cannot be trampled on with impunity. The God of all nature could never intend that any bearing his image should live on the charity of their fellow-beings.*

* Among the many and admirable charities in London, none would seem to have a greater claim on public sympathy and support than that for the distressed needle-women, perhaps the most unfortunate and helpless among all those who depend on others for their daily bread. It would appear that except in the London season, as it is called, they are hardly able, or it should rather be, totally unable, to support themselves; much less are they able to pay the high rents commonly asked, even for a meanly furnished single room, and in too many instances resort to prostitution. This tremendous social evil, no charity, however munificently supported, can hope to cope with. If the ladies who give employment through the shopkeepers to these unfortunate women, were in each case to give it at once to the sempstress herself, how much happier would her condition become!

Indiscriminate charity, alms-giving, the endowment of charities, bestowing pensions, and the various other modes of the exercise of benevolence, so praiseworthy in their origin and so injurious in their tendency, should

But if little can be done for the grown-up man, all can be done for the child ; its intellectual and moral worth is lying dead : can the wealthy do nothing for its resurrection ? can they not send forth to the hovels of the wretched the teacher and the philanthropist to rescue the child ? can there be a greater work than to follow the footsteps of Him who "came to teach, and to save that which was lost?"

How much would the number of the poor be lessened by the erection and endowment of schools and seminaries for the children of the poor, and by providing efficient teachers and good books ! The wealth of a community should be willingly bestowed in the rearing and sending forth such teachers, bearing constantly in mind, that "the education of the young is the highest and the most important vocation on earth, and that none but the wise and good should be invited to undertake it."*

give place to a more enlightened feeling, by consulting the real and ultimate good of the poor, and not their temporary relief, or the providing for a few who are fortunate enough to become the recipients of a charitable bounty. The benevolent should exert themselves in helping the poor to help themselves, by teaching them to obtain a maintenance by industry and frugality, and not to remain contented with the momentary gratification of compassionate feelings.

Such charity, it may truly be said, would bless the giver as well as the receivers, who would be rendered by it not only happy in themselves and grateful to their benefactors, but *valuable* to the community.

* On the subject of books for the labouring poor a great error prevails. It is generally thought that if a man is ignorant, any book, however weak, is good enough for him. On the contrary, it would seem that the greater his ignorance, the more powerful the words and ideas which are to rouse his attention. This is only to be done by rendering as cheap as possible the works of standard authors, and perhaps still more by the most powerful minds in the community giving themselves earnestly to the subject of teaching the poor. This indeed has been done to a certain extent. Archbishop Whately has published an abridgment of his 'Logic,' 'Early Lessons in Reasoning,' suited to the comprehension of all. Mr. Charles Dickens, who has shown that common life may wear a tragic grandeur, and that the haunts of poverty and crime are sometimes lighted up by the

The education of the poor is, without doubt, the first and most important aid that can be rendered them by their richer and more gifted brethren; but there is another means of bettering their condition, second only to mental culture, viz. the providing them with *comfortable homes* ;—a permanent home for themselves, and one in which to bring up their children, is the greatest physical want of the poor. It is the feeling of insecurity, and dread of sudden change, partly consequent on this want, that causes so much discontent among the labouring classes.*

Their present extreme wretchedness in these respects will, it is hoped, make any suggestions acceptable to those who have heart and time and means to devote to the cause of human improvement.

And here it may, perhaps, be as well to advert to a common objection, and one often advanced, to any general or extensive efforts to ameliorate the condition of the great body of the people,—which is the small likelihood of their applying themselves to intellectual or creditable pursuits, were means and leisure found for them. But it should be recollected that the trial has never been fairly made,—that objects calculated

presence and influence of the noblest souls, is publishing and making household words the productions of his gifted mind. This is the true and most effectual way of raising the character of a people—by great, original, and vigorous minds thus diffusing themselves.

* The Legislature might do much towards permanently bettering the condition of the poor, at least in town, by *prohibiting* the letting, to a poor family, of an apartment which is insufficiently lighted, which cannot be ventilated or kept dry, and which generally cannot but injure health. This might be readily done by appointing commissioners to look after these matters, to see that all houses inhabited by the poor are tenantable, well ventilated, light and dry, and have means provided for removing filth. This would be of incalculable benefit to the poor, and would perhaps do more for them as respects their habitations, than anything else that could be thought of, as it would *compel* the landlords to keep in decent repair the wretched houses let out to them, and for which the rents now paid are so exorbitant.

to rouse and interest the intellect and feelings have never been systematically presented to them,—and more than this, it is not till the *physical wants* of man are in part satisfied, that he finds time and opportunity for thought. It is a libel on Creative Wisdom to suppose that having bestowed on him such glorious faculties, and having placed him in a world calculated to afford them scope and exercise, he will be for ever blind to their influence.

But even where no thought of permanently bettering the condition of the poor is entertained, and no thought of the future has any weight, there will surely be something to startle in the fact, that in every large city there dwells a multitude of human beings, falling or fallen into the extreme of moral degradation and bodily destitution,—living in dark, filthy houses, or crowded together in unventilated rooms or damp cellars, where the outward gloom is a type of the darkened mind, and where the child is trained amidst impure words, idleness, and the fumes of intemperance, and is thence sent forth to wander as a thief or a beggar. And this moral pestilence, it must be borne in mind, is not confined to those who actually live in it, but is continually present to those who imagine themselves far removed from its influence. It is dearly paid for in the support of the prisons, madhouses, hospitals, which everywhere surround them, and sometimes in the ravages of contagious diseases, which visit all equally,—the rich and the poor, the generous and the selfish.

Mr. Charles Dickens eloquently writes—“O for a good spirit, who would take the housetops off with a more potent and benignant hand than the lame demon in the tale, and show a Christian people what dark shapes issue from amidst their homes, to swell the retinue of the destroying angel as he moves forth among them;—for only one night’s view of the pale phantom rising from the scenes of our too long neglect, and from the thick and sullen air, where vice and fever propagate together, raining the tremendous social retributions which are ever pouring down, and ever coming thicker! Bright and

blest the morning that should rise on such a night ; for men, delayed no more by stumbling-blocks of their own making, which are but specks of dust upon the path between them and eternity, would then apply themselves like creatures of one common origin, owning one duty to the Father of one family, and tending to one common end,—to make the world a better place.”

It may be useful to add further and more practical reasons why the necessities of the poor, as regards their *habitations*, should meet with increased attention. It will be found to be not only a good and wise but a necessary subject for serious consideration.

Lord Brougham, speaking of national education, says,—“The efforts of the people are still wanting for the purpose of promoting education ; and parliament will render no substantial assistance until the people themselves take the matter in hand with energy and spirit, and the determination to do something.”

If this be true of the *mental cultivation* of the people, it is not less so of their *physical condition*.

But as the efforts already made to improve the condition of the labouring classes of society, as regards their *habitations*, are of so recent a date, the very great *necessity* for them may perhaps be unknown to many ; and by others disregarded, thinking the accounts they hear of the miserable dwellings of the poor exaggerated. To assist in removing these causes of indifference, the following short extracts are made from various sources, as they show, beyond all question, the present wretched and hopeless state of the poor in this particular, and the necessity that exists for at least attention to it.

One house in the neighbourhood of Monmouth Street was stated in the ‘Times’ of September 2, 1833, to be let out to various families, consisting of fifty-four human beings, and as yielding a rent to the landlord of between £90 and £100 per annum. The underground floor, consisting of one

apartment, was occupied by one man, one woman, and five children ; the ground floor, two apartments, occupied by two men, two women, and eight children ; the first floor, two apartments, two men, three women, and five children ; second floor, two apartments, containing three men, four women, and six children ; garrets, two rooms, occupied by three men, three women, and six children. Thus it appears that a house (and there are hundreds let in a similar manner) in a densely populated and extremely unhealthy neighbourhood, consisting of nine small rooms, was occupied by no less than eleven men, thirteen women, and thirty children, breathing the air of pestilence ; and such is the confined state of the neighbourhood that a breath of air can scarcely enter within its purlieus.

The Rev. W. Quekett says, that in St. George's in the East there are 2618 houses, of which 1802 are occupied by the poor. Devonshire and Star streets contain 123 houses, which comprise 492 rooms, in size eight feet high by eight feet square, having on the average three persons in each room. There are 6328 rooms inhabited by separate families.

Now hospitals allow 1000 cubic feet of air for each patient, and the workhouses from 500 to 600, but the quantity, as seen above, obtained by the independent labourer of St. George's in the East, is only 170 cubic feet,—a deficiency which must inevitably engender fatal diseases.

He continues, “I have seen from three to four families, of different sexes and of various ages, living in one small room. They eat, drink, sleep, wash, dress, and undress therein, without curtain or screen of any kind. Every domestic arrangement essential to the preservation of decency and cleanliness is wanting. The atmosphere is of the most foetid and pestiferous kind, whilst the water in the house-butts, preserved for the purposes of drinking as well as of washing, is so foul and offensive that the poor lodgers are driven to seek some of a pure kind at the nearest public-house, and are thereby compelled to spend much of their hard earnings in stimulating drinks. There are courts which contain houses

in so dilapidated a state, that the inhabitants, amounting to from sixty to seventy, composed of men, women, grown-up boys and girls and children, are obliged to frequent one public convenience, open to public gaze."

Wretched as is the condition of the poor in this parish, it is just as bad in the wealthy parish of St. James, as reported by the Rector. The same too may be said of the still more opulent parish of St. George. In a word, the dwellings of the poor are, with slight variations, equally bad in every parish in the metropolis.

Such is generally, as respects their dwellings, the state of the labouring population in the metropolis. The condition of the great body of the people throughout the empire may be inferred from the following statements.

The Rev. Dr. Gilly, Vicar of Norham, in Northumberland, says in a pamphlet entitled 'The Peasantry of the Border,'— "The general character of the best of the old-fashioned hinds' cottages in this neighbourhood (Norham, on the banks of the Tweed) is bad at the best. They have to bring everything with them; partitions, window-frames, fixtures of all kinds, grates, and a substitute for ceiling; for they are mere sheds. They have no byre for their cows, no sties, no pumps or wells, nothing to promote cleanliness or comfort. The average size of these sheds is about twenty-four feet by sixteen feet. They are dark and unwholesome. The windows do not open, and many of them are not larger than twenty inches by sixteen inches; and into this space are crowded eight, ten, and even twelve persons. How they lie down to rest, how they sleep, how they can preserve common decency, how unutterable horrors are avoided, is beyond all conception. The case is aggravated when there is a young woman to be lodged in this confined space, who is not a member of the family, but is hired to do the field-work, for which every hind is bound to provide a female. It shocks every feeling of propriety to think that in a room and within such a space as I have been describing, civilized beings should be herding together without a decent

separation of age and sex. So long as the agricultural system, in this district, requires the hind to find room for a fellow-servant of the other sex in his cabin, the least that morality and decency can demand is, that he should have a second apartment, where the unmarried female and those of a tender age should sleep apart from him and his wife."

The agricultural labourers' cottages in Bedfordshire are thus described by a writer in the 'Sanitary Report.'

"If we follow the agricultural labourer into his miserable dwelling, we shall find it consisting of two rooms only. The day-room, in addition to the family, contains the cooking utensils, the washing apparatus, agricultural implements, and dirty clothes; the windows broken, and stuffed full of rags. In the sleeping apartment, the parents and their children, boys and girls, are indiscriminately mixed, and frequently a lodger sleeping in the same and only room: generally no window,—the openings in the half-thatched roof admit light, and expose the family to every vicissitude of the weather: the liability of the children so situated to contagious maladies frequently plunges the family into the greatest misery. The husband, enjoying but little comfort under his own roof, resorts to the beer-shop, neglects the cultivation of his garden, and impoverishes his family. The children are brought up without any regard to decency of behaviour, to habits of foresight or self-restraint; they make indifferent servants. The girls become the mothers of bastards, and return home a burden to their parents or to the parish, and fill the workhouse. The boys spend the Christmas week's holiday, and their year's wages, in the beer-shops, and enter upon their new situation in rags. Soon tired of the restraint imposed upon them under the roof of their master, they leave his service before the termination of the year's engagement, seek employment as day-labourers, not with a view of improving their condition, but with a desire to receive and spend their earnings weekly in the beer-shop: associating with the worst of characters, they become the worst of labourers, resort to poaching,

commit petty thefts, and add to the county rates by commitments and prosecutions."

The same writer says—"On entering an improved cottage, with a neat and cultivated garden, in which the leisure hours of the husband are pleasantly and profitably employed, it will be found that he has no desire to frequent the beer-shop, or spend his evenings from home: the children are trained to labour, to habits and feelings of independence, and taught to connect happiness with industry, and to shrink from idleness and immorality; the girls make good servants, obtain the confidence of their employers, and get promoted to the best situations."

Another writer in the same Report says—"The cottager feels that he is somewhat raised in the scale of society. He sees his wife and family more comfortable than formerly; he rises in respectability of station, and becomes aware that he has a character to lose. Having acquired these important advantages, he is anxious to retain and improve them. On the other hand, a man who comes home to a poor comfortless hovel after his day's labour, and sees all miserable around him, has his spirits more often depressed than excited by it. He feels, that do his best, he shall be miserable still, and is too apt to fly for a temporary refuge to the ale-house or beer-shop. But give him the means of making himself comfortable by his own industry, and I am convinced, by experience, that in many cases he will avail himself of it."

The late Mr. Loudon says, on this subject, that "The existing race of labourers can only be benefited by the humanity and kindness of those of their employers who are men of wealth. The unhappy and unsettled habits of common British labourers, whether employed in agriculture or in the manufactories, is most deplorable, and every effort should be made to better their condition; and I know of no way in which this can be done so easily, as by arranging so as that every married country labourer may occupy a comfortable cottage and garden." A benevolent and comprehensive wish, and

worthy of the kind-hearted and unselfish man who uttered it.*

These accounts are sufficient to show the existing state of the labouring population throughout the empire, for although they refer only to particular localities, they are taken at random, and the condition of the whole will be found on examination to be equally deplorable. But the evil does not end here,—it is not simply the fact of so many people living in such wretched habitations, but it is a *deficiency* even of these, that helps to fill the union workhouses, and adds to the burden of supporting the poor.

Much diversity of opinion prevails on the causes of pauperism, and the remedies for it, as also on the best means of managing the poor. Many political economists, of whom the late Dr. Chalmers was the chief, have taught that there should be no legal provision for the indigent ; that all compulsory assessments for the poor are injurious to society ; and maintain that private benevolence, if fairly left to itself, is quite adequate to provide for them.† Other men, equally wise and experienced in the world, have taught the very opposite doctrine, and are altogether disbelievers in this alleged power of the principle of benevolence.

* The author would here acknowledge the great assistance and benefit he has derived from the perusal of Mr. Loudon's work on Cottage Architecture, and express his surprise that no public acknowledgment, not even by the numerous friends of Mr. Loudon, either in the shape of a monument or otherwise, should ever have been made to his great usefulness and his disinterested efforts to improve the condition of the labouring classes.

† To show how far the principle of benevolence would be likely to provide for the poor in the absence of a poor-law, it may be sufficient to instance the case of the city of Edinburgh, where, according to Professor Alison, the whole of the charitable institutions are sustained by about fifteen hundred benevolent individuals, many of whom subscribe to them all, while the remaining twenty or thirty thousand of the adult population of the city and suburbs, who are able to bear a part of the burden, never contribute a farthing, and at the same time steadily withstand all appeals for private alms.

A great philosophical writer of the present day thus shows the causes of pauperism.

“The causes of that degree of poverty which amounts to destitution are great *defects* in the *body* or the *mind*, or *both*, of the individuals who fall into this condition.

“The lame, the deaf, and the blind, it is evident, may be poor through bodily defects. But the *most numerous* class of destitute poor is that which springs from intellectual incapacity, not amounting to *idiotey*, but occasioning so much mental weakness that the individuals are not capable of maintaining their place in the great struggle of social existence. Persons so constituted often provide for their own wants, although with difficulty, during the vigorous period of their lives, and become helpless and a burden on the community in the wane of life.

“Another cause is ignorance, general mental incapacity for acquiring knowledge, and sometimes the want of knowledge of any business or calling.

“Another cause of pauperism is the habit of indulging in intoxicating liquors. This practice undermines the health of the whole nervous system, through which it operates most injuriously on the mind; indeed, the effects of habitual intoxication are well known.

“The last cause is a great convulsion which occurs every few years in our manufacturing and commercial systems, which by deranging trade, deprives many industrious individuals of employment, casts them on charity for subsistence, breaks down their self-respect and feelings of independence, and ultimately degrades them into helpless pauperism.”

General incapacity, bodily and mental, being thus seen to be the chief causes of pauperism, therefore all treatment calculated to weaken the bodily or mental powers of the poor must have the effect of increasing, or, at any rate, keeping at its present amount, the number of the helpless poor. But a worse evil than the present state of the adult poor, and that which tends to perpetuate and increase pauperism, is the

treatment to which pauper children are subjected; they are fed on the poorest and cheapest fare, and sometimes an insufficiency of that. Bad feeding in childhood weakens the body and the mind, and consequently diminishes the power of the individuals to provide for themselves, and thus perpetuates the evil.

But the treatment pursued in the workhouses with the destitute poor, is thought, in the case of the able-bodied and old, to be the surest means of deterring others from falling into a like state, and becoming idle and a burden to the community; yet in the case of the young, no such motive can have any influence. Economy would seem to be, in both cases, the chief reason of its adoption; and as the experiment may be now said to have been well tested, and the result to be a continually increasing pauperism, some other mode of managing the poor must in time be thought of. Professor Alison has demonstrated by irrefragible evidence, that the wretched pittances doled out to the poor are inadequate to their comfortable subsistence, and that a continually increasing pauperism is the actual and inevitable consequence of the deep mental depression and physical degradation in which they habitually exist.

But attention should be given, not only to existing paupers, but, what is of far more importance, to the preventing those persons now earning their subsistence from falling into that state, and more especially to the means of saving another generation from springing up, and thus increasing and perpetuating the evil.

If any plan, therefore, can be devised, to prevent even in a slight degree the *increase* of this wide-spreading evil, it must be worthy of attentive consideration.

One, and perhaps the chief means of accomplishing it, (after a sound moral and practical education, which would enable the people to think for themselves, and to become, consequently, independent of others,) would be the providing the poor with comfortable habitations, at a rent commensurate with

their means.* The rents being more moderate, the poor would be able to live better, the public-house would be less frequented (bad living being one of the causes of intemperance), the hospitals and workhouses would be less resorted to, as the sick and helpless would remain with their relatives, which they cannot now do, principally for want of room.

An attempt to lessen the number of the destitute poor, (and so to decrease the poor-rates,) by providing them with comfortable habitations, may sound somewhat visionary; but surely it is not expecting too much of human nature, to say that no man, however small his earnings, would suffer an aged parent, or sickly child or other near relative, to become the inhabitant of a workhouse, who had a spare room at home in which to lodge them.

This would, in time, do something to prevent the increase of pauperism, by going to the root of the evil, by making the physical condition of the poor more comfortable, and by its tendency to ameliorate their whole condition by inducing habits of cleanliness, order, and self-respect.

But a series of objections have been and still are urged by some political economists against the system of building cottages for the labouring poor, and it is of the greatest importance that they should be known, as it is upon the views entertained by the political economist, more than to any

* There are but few individuals who cannot provide themselves with food and clothing; *it is the non-payment of rent*, from its high amount and the consequent misery and ruin which inevitably follow, that creates so much distress. The truth of this may be proved by inquiring among the industrious classes, both housekeepers and lodgers, when the *rent* will be found to be the great subject of anxiety.

Instead of the multitude of charitable institutions which exist, and are so liberally supported at the present time, and which, from the narrow sphere of their operations, do comparatively so little good, how much better would the funds be employed in providing habitations for the labouring poor, and also for assisting them in times of commercial distress, want of employment, or other causes, in the payment of their rents!

efforts that can be made by divines and philanthropists, that the future prospects and condition of the poor must depend.

Mr. M'Culloch says—"Were cottages, with small pieces of ground attached to each, let at a moderate rent to a few of the most industrious labourers in the best cultivated districts of Great Britain, there can be no doubt that the situation of those individuals would in the first instance be ameliorated. They would acquire these possessions with previously formed habits of industry and economy. When their own farm did not require their exertion, they would find employment on the more extensive farms in the vicinity, or leisure time would be found for intellectual or other amusement."

But Mr. M'Culloch, with other political economists, thinks that the good done to the agricultural labourer, as above described, would not be of long duration, and that in course of time he would become disgusted with the life of laborious exertion he had formerly led, and that, having become comparatively independent, and not being under the necessity of constantly employing himself, occasional intervals of relaxation would take place. (The very point which the philanthropist has in all ages sought to bring about, leisure for the people at large for mental cultivation, is here stated to be a great evil.) He goes on to show the probable results of this leisure. "A cottager, however small his possessions, has some produce to sell. This, together with his spare time, leads to a habit of going to market: and 'nothing can be more absurd, (says a Mr. Young, whom he quotes,) than a strong hearty man walking some miles, and losing a day's work, to sell a few eggs or a chicken: such habits, too, are sure to lead to dissipation. The small farmer must have his porter and his gin, as well as the large farmer.'"

He further says, "it is obvious that the beneficial effects observed to follow the first introduction of small farms depend almost entirely on the power of the occupiers to employ themselves at other work, when their labour is not required at home. With a generally extended cottage system this could

not be the case: where all farms are small, none would require the labour of extra hands, and having thus no work to do himself and nothing to do for others, he would sink into a state of stupid and sluggish indifference.*

“ It should always be borne in mind that, except maimed and impotent persons, there cannot be any poor in a country that deserve to be relieved, unless the population be *redundant*; for so long as the supply of labour does not exceed the demand, the whole of an industrious part of a community may be employed. An industrious man can never be long without employment from any other cause. It would, therefore, be absurd to introduce a system which should lead to a redundancy of population. A man who gets possession of a cottage finds himself in a position to marry; and the cottager, feeling an increase of wealth, at least of security against want, is naturally stimulated to that engagement.

“ But the rendering it as difficult as possible for a man, when married, to get a house to live in, is found so conducive to easing the rates, that it universally gives rise to an open war against cottages. How often do gentlemen, who have possessions in a parish, purchase the cottages and raze them to the foundation, that they may never become the nests of beggars’ brats. A most intelligent witness, Mr. Hodges, M.P., says, ‘ I am quite satisfied that the erection of cottages has been a most serious evil throughout the country, and I have, with others, pulled down between twenty-six and thirty cottages, which, had they been left standing, would have been inhabited by young married couples.’

“ The Poor-Laws,” he continues, “ have opposed the most powerful obstacle to the cottage system, or the increase of

* Why, with a generally extended cottage system, *all* farms should be small, does not appear; but even if they were, with a piece of ground large enough to be called a farm, it is difficult to conceive how any one man can at any time be idle. But giving the cottager a small plot of ground to cultivate (one-sixth of an acre), is not giving him a *farm* to live by, but a *garden* to assist him to live.

cottages ; and consequently to the increase of the agricultural population. If the population of an estate is unduly augmented, the landlords and occupiers are burdened with the support of all, who from old age, sickness, want of employment, or other cause, might become unable to support themselves : they are unwilling to incur any such responsibility, and are therefore compelled to take measures to diminish the population, by pulling down cottages, and preventing their being rebuilt. The influence of this principle has been powerful."

But Mr. M'Culloch allows "that these evils may in part be obviated, by making the *owners* of all cottages responsible for their occupants, or, by making the assessments to the poor proportional to the population on the land, as well as to its value."

It would of course extend this part of the subject too far, to institute a detailed comparison of these two methods of getting rid of the poor. The first has yet, on a comprehensive scale, to be tried. The second does not seem to be very clearly made out.

Mr. M'Culloch says, that "by rendering it as difficult as possible for a man, when married, to get a house to live in, is found to ease the rates ;" that is, it gets rid of the poor,—they leave the locality : but he does not attempt to show how this system would act if universally carried out; he does not say where the poor people go to when the houses are too few or the rents are found too high for them, nor whether another parish is found to suffer by their becoming residents in it, or whether they become migratory, wandering about from place to place, and so equalizing the rates.*

* Indeed, all that has been urged against providing the industrious classes with comfortable habitations (setting aside any political considerations) would seem to amount to this, that the difficulty of obtaining houses to live in, consequent on their scarcity, is so discouraging, that the poor remain in a state of single blessedness rather than incur the risk of passing their lives in so much misery. But what has been stated above goes far to prove that they marry and have children under all circumstances,

It would be curious and interesting, and might throw some light on the question, to follow the fortunes of the unfortunate inhabitants of the between twenty-six and thirty cottages razed to the ground by the far-sighted Mr. Hodges.*

But it must be left to a fair trial and for others to determine which of these two systems is likely to be most beneficial to the community at large—by their attentively considering the nature and causes of pauperism—by considering how far the forcible removal of a family from one parish into another is likely to decrease their numbers—by considering how far the workhouse system of feeding children and breeding paupers is calculated to prevent their increase—and by considering whether the healthy children of the well-housed and well-fed peasant are so likely to become a burden to the community as the offspring of the wandering and half-starved victim of this policy, or the still more wretched sons and daughters of the inhabitant of a pauper union.

however wretched—as eleven men, thirteen women, and thirty children living in one small house—and even four families in one room.

* These pseudo-philosophers do not presume to tell us how far such beggared and turned-out cottagers could be expected, in the hour of need, either to aid in the defence of their country or to render assistance in the protection of private property: on the contrary, it might be found, as in the time of Harold, that such migratory masses had become wholly indifferent as to any change in their condition.—J. W.

CHAPTER II.

SECTION I.—SITE AND POSITION.

IN the erection of a cottage, a chief subject of consideration should be the choice of a *situation*, not only as respects its capability for efficient drainage, dryness, and general healthiness, but also as regards its relative position with other buildings ; and, where a number are to be built on an entirely new site, to their being so placed as not to interfere with or injure the effect of the surrounding scenery.

Where possible, the cottage should stand by the side of a public road, as well for the sake of the cheerfulness of the inmates as for the beauty and life it imparts to the road itself, and the consequent pleasure it affords to the passers-by.

The cottage should be so placed that the sun may shine on the most frequently inhabited sides of it throughout the year. It should therefore, in this country, face in the direction of north-east, south-west, north-west, or south-east. The front of it can therefore, only in certain situations, be parallel to the public road ; but the preference should be given to the south-east, when practicable ; the diagonal line through the main building being a north and south line.*

* The lamentable way in which the beauty and loveliness of the finest landscape may be injured or destroyed by *buildings* and *grounds* is exemplified by the far-famed view from the top of Richmond Hill. What it was when Thomson wrote, it would perhaps be difficult to say ; but now—instead of the houses and villas, and the gardens about them, harmonizing with, and forming a part of the general view, to be examined in detail after the eye is satiated with the whole—the eye is first struck with the glaring newness (for they all seem as if they were painted and pointed regularly once every year) of first one and then another of these regularly built boxes, placed in the middle of a large square garden or lawn, and

Every cottage should have a garden attached to it, of not less than one-sixth of an acre, to be cultivated by the cottager; it should be bounded by a low wall or hedge, irregular on plan, so as to interrupt the general view as little as may be by regular forms.*

The cow-house and pigsty (where they exist) must, of course, be within the ground occupied by the cottager, but they should be built as far from the house as possible, in one angle of the

surrounded by a high fence; and the country round being thickly wooded close up to the wall, the formality of the *grounds* is rendered truly distressing.

A landscape made up of a collection of square fields, surrounded by regular hedge-rows and dotted here and there with cubical newly painted boxes and straight roads, may satisfy, as it commonly does, the owners of the several lots, but can never be otherwise than painful to the eye of an artist. But what is called landscape scenery in England is mostly of this description, and appears to be admired on the ground of its cultivation and plenty qualities, perfectly distinct from it, considered as a beautiful object.

If any general rule could be given for the laying out building ground, it would be to avoid every thing usually considered essential,—long rows of houses all of the same height,—semicircular rows, with a tall house at each end, and a taller one in the middle, &c. The ugliness of the common plan will be seen by contrasting the picturesque cities of York or Lincoln with the formal and uninteresting appearance of Bath or Cheltenham; or they may be seen side by side in the old quaint town of Hastings and the modern triumphal-arched town of St. Leonard's. From this cause, London, though the largest, is probably the least picturesque city in Europe. Mr. Disraeli, in his 'Tancred,' has ably contrasted the old part of London with the new, and has pointed out the absence of all interest or character in the modern portions. Strange that he should have been able to see so clearly that which the professors of the art have not only been blind to, but are continually helping to increase.

* If the partition between the cottages be formed of evergreens, or other shrubs, they should not be cut architecturally, as has been sometimes recommended for the purpose of showing the cottager's taste. If the cottager is to show his taste and ingenuity in no better way than cutting a tree into the shape of a church or a goose, he had much better remain idle.

ground. No inconvenience is likely to be experienced from damp, smells, &c., where the construction and management, and especially the drainage, is good. Rabbits and poultry may be kept by the cottager with little trouble or expense, especially where there is a garden.

SECTION II.—DRAINAGE, AND SUPPLY OF WATER.

The complete *drainage* of a cottage is a point of the utmost importance, as upon it mainly depend the health and comfort of its inmates. And not only is it requisite that the drainage be perfect, but it must be as little liable as possible to get out of order, and when disturbed for the purpose of cleaning, should be capable of re-instatement with the materials at first used.

Although a complete system of drainage would seem to have but little to do with cottage building, a general view of the subject is necessary, as the substitution of the liquid manure-tank for the common cesspool is most desirable,—and the more especially, as in cases where a number of cottages are erected, one tank might serve the purpose of the whole.

The most essential points to be attended to in the drainage of buildings generally are the following :

All *main sewers* should be formed with concave bottoms, to allow the water, however small in quantity, passing along with solid matter, to act with the utmost possible effect ; * and they should be evenly built, not only that any solid matter may be unobstructed, but that the force of the running water may be as little lessened by friction and distribution as possible. They should have arched tops, and be of sufficient height and width to allow men to pass along to repair or cleanse them.

They should have a *fall* of not less than $1\frac{1}{2}$ inch in every 100 feet in length, and more than this in all cases where the flow of water is variable.

* Common sense and science seem to point to the concave form as the best possible for the bottom of a sewer ; and the circular form is recommended by the Board of Health.

They should have a constant flow of water through them, or powerful flushes at stated intervals.

Means should be provided for their complete ventilation; that is, fresh air should enter them from a low level, and the heated and foul air should pass away at as high a level as possible.

All *soilage drains* are found to be of sufficient dimensions, and the soil and water find ample room to pass along, in a tube equal in capacity to a cylinder of 6 inches in diameter.

They should have a fall of not less than $\frac{1}{2}$ an inch in every 100 feet, under favourable circumstances; and when the water is likely to be small in quantity, as much as 2 to 3 inches.

They should be made water-tight, that the liquid portions of the soilage may not escape, and leave the solid matters in the drain.

They should have a constant flow of water through them, or water in continuous flushes on the lower levels, to carry the soilage onward, and to prevent any solid matter from being deposited within them.

To prevent the foul air generated in or returning by the drains, the waste-ways should be double-trapped, by a bell-trap at the sink where the waste water enters, and by a well-trap short of the inlet to the drain.

All drains should be so constructed as to admit of being opened for the purpose of cleansing without breaking them, and of the displaced portion being afterwards replaced.

A great defect in the common soilage drains, whether built in brickwork or of earthenware pipes, is, that they have to be broken up whenever they require cleansing. This might

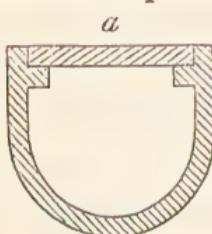


Fig. 1.—Section of drain-tile.

be obviated by using drains of the form here represented. The upper tile *a*, in the figure, could at any time be lifted off, and the drain cleared, without the necessity of breaking the drain, or of removing any portion of the earth except that immediately covering it. (Fig. 1.)

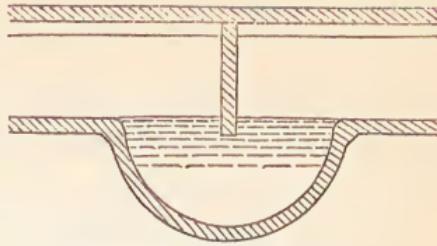
A simple kind of trap, applicable to this form of drain, (its transverse section being the same,) and equally effective as regards its capability of being readily cleansed, is shown in the figure. (Fig. 2.)

A form of joint adapted to drain-tiles of this section is here shown: it admits of the cement being poured in (as lead is) in a liquid state, and thereby obviating the common and troublesome mode of fixing. (Fig. 3.)

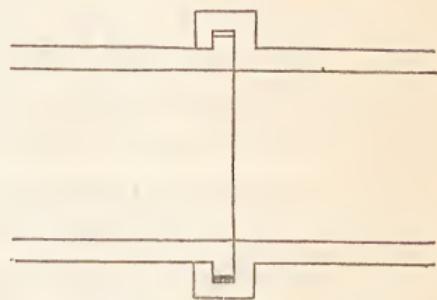
A section and plan of a drain-trap, to be formed of iron or earthenware, is shown in the adjoining figures. The plate α should not be fixed down, but be left loose, so as to allow of its ready removal, and the cleansing of the trap. It would perhaps be as well to leave the whole of the trap loose, which would allow of its being lifted out, and any obstruction removed. This form of drain-trap is suitable for yards, areas, &c., and, slightly modified, for streets. (Figs. 4 and 5.)

The *Ventilation* of drains would appear to be of the less consequence if their complete cleansing could be insured.

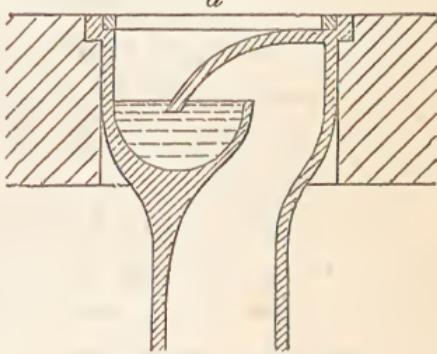
Mr. Hosking proposes to keep clean the main sewers of a



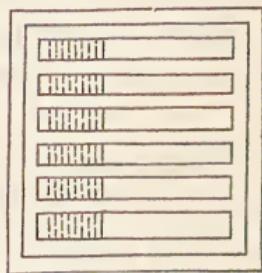
[Fig. 2.—Section of drain-trap.]



[Fig. 3.—Plan of drain-tile.]



[Fig. 4.—Section of drain-trap.]



[Fig. 5.—Plan.]

town by means of a copious stream or flushes of water, to be supplied by the water companies from ornamental reservoirs, to be situated in the outskirts of all towns, and which might also be used as swimming-baths, and thus be made to answer two important purposes.

But this plan, although perfectly effective as regards the main sewers, leaves untouched the drains from the houses to the sewers, and it is from these that the inhabitants suffer most. The waste water from the sinks does not seem to be sufficient to cleanse thoroughly these drains ; but their cleansing may be effected, and at little expense, by simply shortening, by one or two inches or more, the waste-pipe of the cistern in each case ; for as the water comes in from the main faster than it runs off by the waste-pipe, the cistern would continue to fill, till the rate of its coming in (which is always regulated by the ball-cock, and becomes gradually less as the ball rises) became exactly equal to the quantity running off ; and this it would of course continue to do till stopped at the main, the quantity of water running off being regulated by the length of the waste-pipe.

By this plan every house-drain might be daily cleansed with water, and kept at a low temperature, at a trifling expense, that is, at merely the cost of the water ; and as the quantity of water from each cistern (though small) would in each street amount to a considerable body, it would serve also to cleanse completely the main sewers themselves, without the necessity of any separate apparatus, as proposed above.

Mr. Hosking also proposes to ventilate each house-drain by forming a communication from the drain to a chimney-shaft, or by building a shaft for the purpose, and thus conducting the gaseous matters to the upper air. The heated air of the drains, being found to be from thirty to fifty per cent. higher than the external air, would of course ascend ; the fresh air being supplied at the mouth of the main sewer.

A number of plans have been proposed, and some adopted,

for ventilating the main sewers of a town, but none apparently with perfect success.*

If any mode were adopted of thoroughly cleansing and cooling all the drains and sewers, the ventilation of the main sewers would be sufficient; and this might be readily effected by means of a high shaft or chimney, equal in superficial capacity to the opening of the sewer, a powerful draught being induced by means of a steam-jet or otherwise: the fresh air to be supplied through gratings at the *head* of the sewer, to insure a complete circulation; the gully shoots in this case being of course trapped.

As before remarked, the air of a cottage or other house can never be kept pure unless the *bell* and *water traps* act perfectly, which they seldom or ever do as at present constructed; for the *bells* of the traps in common use for sinks and other places are usually left loose for the convenience of cleaning them, as various matters find their way into the trap, and the escape becomes choked; and unless the bell is immediately replaced after the foreign matter is removed, the trap becomes of course useless. To remedy this defect, the bell is sometimes soldered down; when the trap, after a time, becomes filled up, and the bell is then forcibly removed and laid aside.

A simple apparatus for cleansing the traps when the bells are soldered down, has been contrived by Mr. Hosking, and described by him, which would be perfectly effective if its careful

* It has been said, that "among the many interesting objects of practical science to be seen in London, there is none perhaps more striking than the mode of ventilating the main sewers; which is effected in the following simple and ingenious manner: open iron gratings are placed at certain distances along the line of the main sewers, so that the gases generated in them are simply conducted through these openings into the street itself."—[This is a nuisance, and often pestilential to the house immediately contiguous. The ventilation should be effected by means of an iron column run up the wall of the adjacent house, above the chimney top, and trapping the iron gratings, as in the case of interior draining.—J. W.]

preservation and use by servants and others could be relied on.

But the bell-traps in common use may be much improved, and made to answer all the uses required of them, be always certain of action, and yet admit of occasional cleaning, by fixing

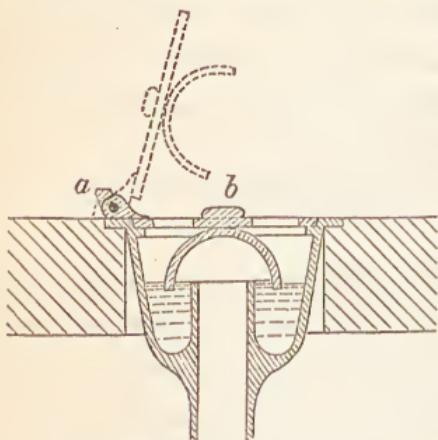


Fig. 6.—Section of bell-trap.

to prevent the bell being thrown back, and left so. It is here shown in section. (Fig. 6.)

The *sink* may be of wood, lined with lead, of stone, or slate, or perhaps, better than these, of earthenware, which, among

the bell to the trap by a hinge, as in the figure, with a projecting piece of metal, to prevent its being but partially raised; so that the bell being held up, while the trap is cleaned, by the knob *b* (as indicated by the dotted lines), falls into its place by its own weight, and can consequently never fail:

the use of the metal stop *a* is

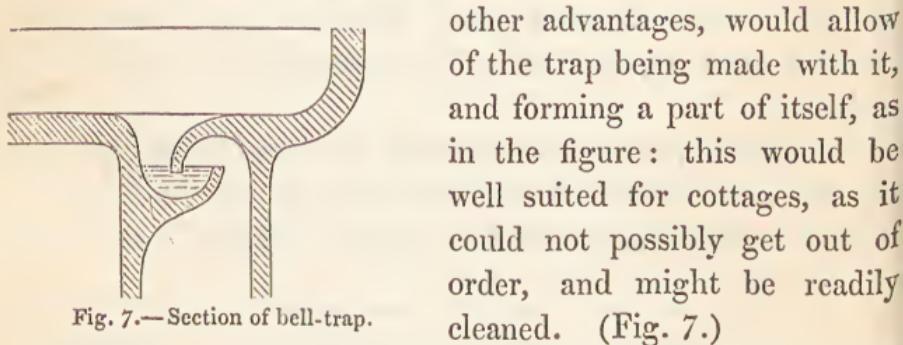


Fig. 7.—Section of bell-trap.

As liquid manure seems from recent experiments to be more valuable than any other, a *liquid manure-tank* should be constructed to every cottage, instead of the ordinary cesspool; and in cases where a number of cottages are built close together, a tank large enough for the whole would be the most economical plan. As they are commonly constructed, the liquid is drawn from them by means of a well, built close to and as deep as the tank itself; but a better plan would be to con-

struct it as described below for the rain-water filter, with the only difference of there being no upper plate *c*, but merely the earthenware tube with the circular end *b*.

Where a liquid manure-tank is constructed, and a complete water-closet cannot be used, the commoner sort may be made to answer every purpose by the pan-pipe being made to dip to within a few inches of the bottom of the tank ; or should the tank be at some distance, the pipe being bent into the syphon form will answer the same purpose.

Under this head the *Supply of Water* may be noticed : for as in building cottages in new localities there can be no regular water service, as in towns, each cottage should be provided with the means of collecting and filtering the rain-water from the roof, and be thus independent, as far as may be, of any other supply,—the more especially as rain-water is the purest of all water.*

It is calculated that the average quantity of water which falls on a square yard of surface in Britain in a year amounts to about 120 gallons, which, for a building containing 100 square yards of roof, gives 12,000 gallons,—an ample quantity for all purposes.

Rain-water tanks are commonly constructed in the following manner : the ground being excavated, the bottom is laid with one course of bricks, upon which two courses of tiles are laid in cement : the sides are formed of two 4-inch brick walls in cement ; and the whole of the inside is then rendered with cement about an inch in thickness. The top is either domed over, or covered with a flat stone.

To filter water into a tank of this kind, a small well or cistern is built close to and touching it : a few inches from

* In places where there is a want of wholesome water, a tank might be constructed large enough to receive the rain-water from the roofs of a number of houses. This would insure a constant supply of soft and pure water for domestic purposes.

The same would apply where there is no complete system of sewerage : a large liquid manure-tank might be constructed.

the bottom of this well a perforated zinc plate is fitted, upon which the charcoal, &c. is laid, and over it another zinc plate. The rain-water from the roof is conducted to the upper plate, and filters through into the tank.

A modification of the above plan is represented in the drawing, where the tank is shown as covered by a stone slab: the filtering apparatus, instead of being a separate construc-

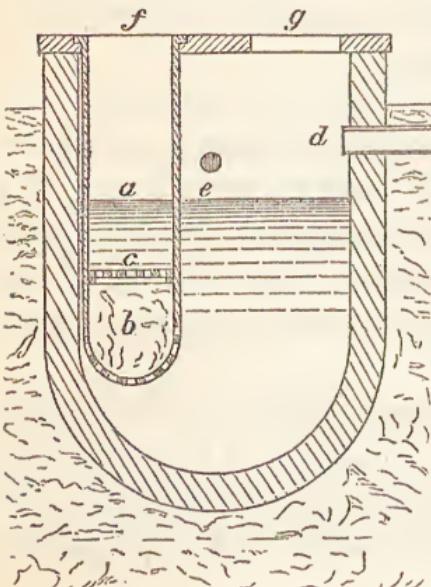


Fig. 8.—Section of rain-water filter.

tion, is formed of earthenware, carefully fitted together, *a*, *b*; the circular end, *b*, is perforated with holes, as is also the plate *c*, the space between being filled with the charcoal, &c. This would admit of ready cleaning, as the filter could at any time be lifted out. A bucket is used to draw up the water, which would seem to be preferable to a pump, as it cannot get out of order. The supply-pipe is shown at *d*, and the waste-pipe at *e*. (Fig. 8.)

SECTION III.—WALLS.

The *Walls* of cottages may be formed of a great variety of materials, and the nature of the material used is a fertile source of variety and beauty. As a general principle, it may be remarked that the walls of a cottage should always be built of the materials furnished by the soil or vicinity where it is situated; for in almost every part of the world the *cheapest* substance for building walls is taken from the earth or other substance on which they are to be built.

In all countries where *wood* abounds (this applies especially to Australia, America, and other thinly peopled countries), it will be found the cheapest, and also a very suitable material

for building. The common objection, its want of durability, may be in a great degree remedied by raising footings of masonry or brickwork, or even by forming a platform of dry earth or rubbish, as a basement for the frame-work of the walls ; and by having the timber well seasoned.

The employment of different kinds of *earth* by ramming for constructing walls dates from a very early period, having been practised by nearly all nations. Houses have been pulled down which the title-deeds show to have been nearly 200 years old. The cob walls of Devonshire have been known to last above a century without requiring the slightest repair ; and the Rev. W. T. Elicombe, who has himself built several houses of two stories with cob walls, says, that he was born in a cob-wall parsonage, built in the reign of Elizabeth, or somewhat earlier, and that it had to be taken down to be rebuilt only in the year 1831.

Earths of different kinds may be formed into walls in either of the three following modes, viz.—in the *Pisé* manner, by lumps moulded in boxes, and by compressed blocks.

The *Pisé* appears to be the best method of forming walls of earth, and, if carefully executed, is one of the warmest, driest, and most durable that can be erected, and at the same time one of the cheapest.

Various modes of forming these walls have been given by different writers : the following appears, however, to contain most of the advantages sought for.

Gravel is the best sort of earth for this kind of walling, and it should be of a loamy nature, with a large proportion of stones. It should be used as dry as possible, no cement being required, as it is held together by the force of cohesion alone.

The foundation upon which *Pisé* walling is to be erected is formed of stone or brickwork, rising not less than six inches or a foot above the surface of the ground, and about six inches wider than the thickness of the intended wall. It should be covered with a layer of Roman cement, stone, or tile, to prevent the rising of damp. The foundation being completed, frames

formed of planks of any convenient length are fixed by resting them on the edges of the stone or brickwork, on either side ; they are held together at the top and bottom by iron bolts, and kept apart at the top by pieces of wood called 'guides,' placed about three feet asunder. The Pisé gravel is then thrown in, about half a bushel at a time, spread evenly, and rammed down till the surface becomes perfectly hard. The work proceeds in this way till the frame is filled to within an inch or two of the upper bolts. A portion of the wall being thus completed, the lower bolts are drawn out and the upper ones slightly loosened : the frame is then raised bodily, till the lower holes rise above the top of the wall ; the bolts are then replaced, and, together with those at the top, screwed up, and the work is proceeded with as before.

One course may be raised upon another, as thus described, immediately it is finished ; but it is found more convenient, and makes better work, to carry on the courses horizontally, and keep them of an equal height. As the work proceeds, the tops of the walls are kept dry by copings or other means ; and when completed to the necessary height, the roof (which should be already framed and ready for fixing) is immediately put on and covered in.

The spaces for the doorways and windows are formed by placing partition boards, fastened to the frame-work by bolts, of the breadth of the wall and height of the frame, on either side of the space to be left vacant ; and pieces of timber, two or three inches thick, shaped like truncated wedges, are then inserted, with their bases in the wall itself, and with their smaller sides touching the partition boards : to these timbers the door-posts and window-frames are afterwards fastened. If the building rises above a ground story, sleepers or plates are laid on the inner side of the walls, as in the ordinary manner, for the floor-joists to rest on.*

* A great improvement in the Pisé walling, and which would make it as durable as stone or brickwork, would be effected by forming the angles

It has not been thought necessary to give drawings or particular descriptions of the frame-work and implements used in the formation of Pisé walling, as they are probably as well known as any other of the implements used in the Builder's art: a slight improvement, however, would be effected in the construction of the frame-work by doing away with the wooden guides, and by altering the form of the bolts.

The above method of forming Pisé walling is different from the mode of building common in Devonshire and the West of England, and known by the name of *cob-building*, as will be seen, and is greatly superior to it, and far more durable.

The substance of which *cob* walls are made is loam or clay mixed with straw and moistened with water; it is formed in frames, in the same way as that above mentioned, but in courses of not more than one foot or one foot and a half in height; it is then left some time to dry and become consolidated before a second course is imposed. The window and door frames are inserted as the work proceeds, and their respective openings cut out after the work is finished. The strength and solidity of cob walling depends much upon its not being hurried in the process of forming, and, when finished, it must be left some months to dry and settle.

Mud walls, or walls of clay lumps, are thus formed: The clay to be used is first freed from all large stones, and soaked with as much water as it will absorb; it is then well beaten, and a quantity of short old straw added, and the whole well and thoroughly mixed up together. The mixing should be continued by the treading of horses, or otherwise, till the clay becomes thoroughly broken, and of about the consistence of mortar: it is then put into moulds, 18 inches long, 12 inches

and door and window jambs of brick or stone. The solid Pisé itself is found to be, when well and carefully constructed, so hard, that when struck with a hammer, the flints break rather than start from the work. Pisé walls, if thus constructed with stone quoins, doorways, and windows, would be well adapted for churches and schools in poor localities. See Wild's 'Cottages for the Peasantry and for Emigrants,' 8vo.

wide, and 6 inches deep, without a bottom, and moulded in the same manner as bricks. These lumps are then dried in the sun, and laid in the usual manner with mortar.

As *brickwork* is so general in its application, and as the price only stands in the way of its still more universal adoption, it may be useful to describe the methods usually employed in building *hollow walls* of brick, and thus to economize material.

Silverlock's hollow walls are constructed of bricks set on edge, each course consisting of an alternate series of two bricks placed edgewise, and one laid across; forming a thickness of 9 inches, and a series of cells, each cell 9 inches in the lengthway of the wall, 4 inches broad, and $4\frac{1}{2}$ inches deep. The second course is laid in the same way, but the position of the bricks alternate, or break joint with the first. This method differs from that of Dearne, described below, in being carried up in Flemish instead of English bond. It is represented in section and elevation in the adjoining figures. (Figs. 9 and 10.)

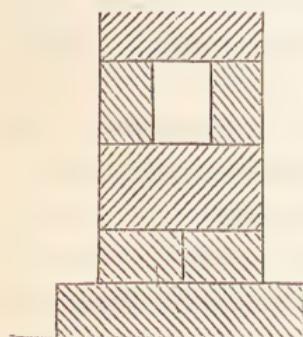


Fig. 9.—Section of Silverlock's hollow wall, 9 inches thick.

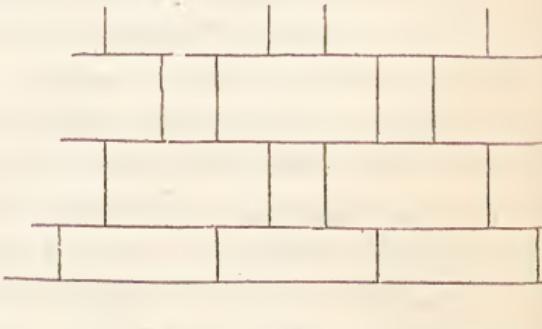


Fig. 10.—Elevation.

Another method of building hollow brick walls is that of Mr. Dearne, in which the lower courses up to the level of the floor are formed in English bond. The next course consists of a series of stretchers on edge on each side, thereby leaving a hollow space throughout the length of the wall: the next course is a row of headers, laid flat; and the same system is

continued throughout. The figures represent a plan, section, and elevation of the wall. (Figs. 11, 12, and 13.)

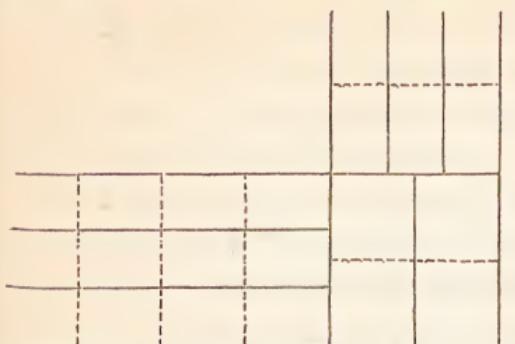


Fig. 11.—Plan of Dearne's hollow brick wall,
9 inches thick.

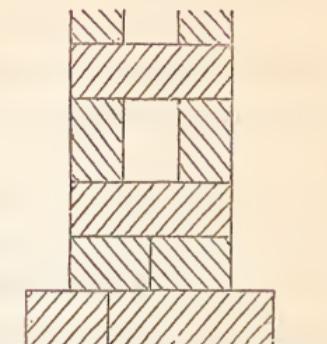


Fig. 12.—Section.

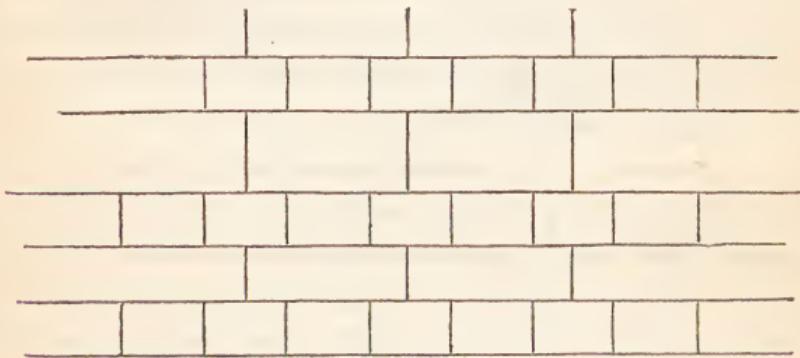


Fig. 13.—Elevation.

Mr. Loudon has proposed a method of building hollow walls 11 inches thick, by keeping the headers or cross bricks 2 inches within the line of the stretching or lengthway bricks, and consequently the latter will be 2 inches apart along the centre of the wall. “Walls built in this way are handsome on the fair side; at least equally strong with solid walls; always dry, and less easily penetrated by cold in winter or heat in summer. The inner surface, being uneven, is peculiarly favourable for receiving and retaining the plaster.” (Fig. 14.)

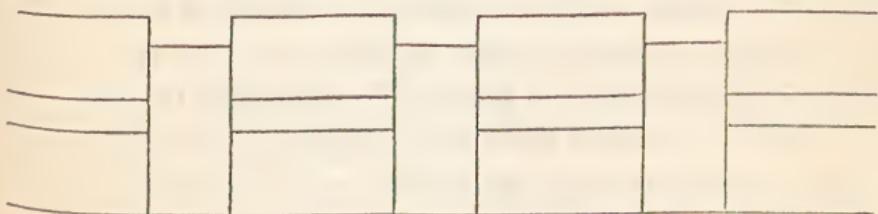


Fig. 14.—Loudon's hollow brick wall, 11 inches thick.

Another mode, 12 inches thick, is represented in the engraving. (Fig. 15.)

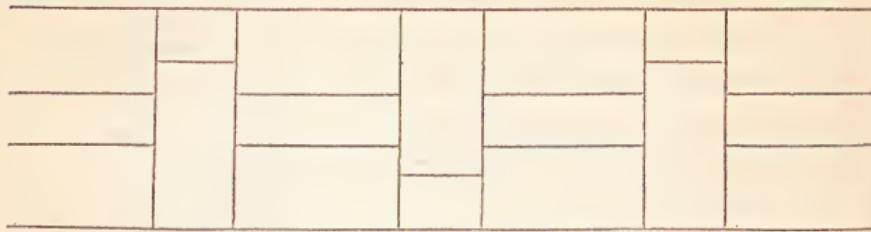


Fig. 15.—Hollow brick wall, 12 inches thick.

The following mode of building a hollow brick wall, 14 inches in thickness, requires but a few additional bricks to that required for a 9-inch solid wall. It is constructed as shown in the figure, which represents one course, the one above that being reversed. (Fig. 16.)

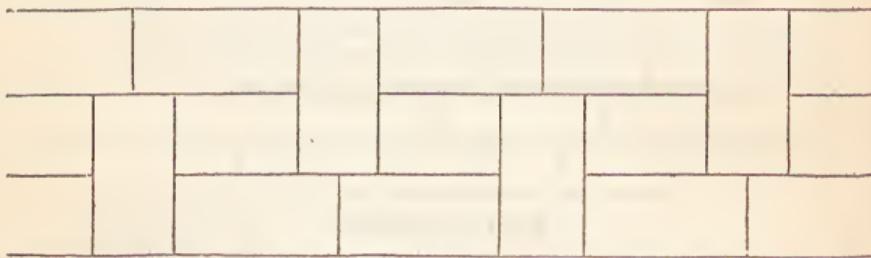


Fig. 16.—Hollow brick wall, 14 inches thick.

In the chalk counties of England and elsewhere, the *flint-built* walls of the middle ages might be used. They are formed by building the flints up in frames, and pouring cement into the interstices. The cement employed may be composed of thoroughly burnt chalk, slacked with water, and mixed with two parts of rough sharp sand, and small sharp gravel-stones; the whole to be mixed up together while dry, and a sufficient quantity of water added to make it into a liquid paste. The foundations must be of brick or stone, and the roof should have a bold projection, to protect the walls from the rain. In this mode of forming walls are included all the small land-stones of a country, so far broken as to incorporate on the cementitious principle of construction.

The Roman circus at Toulouse and the ancient castle at Hastings, besides many other buildings, are built of these materials, and have endured for centuries.

The following mode of constructing external walls of *framed timber, rubble, and plaster*, is common in and about Paris, and is described by Mr. Hosking:

The framed timber structure being completed, strong oak batten laths from 2 to 3 inches wide are nailed to the quarters horizontally, at 4, 6, or 8 inches apart, according to the character of the work, and the spaces between are loosely built up with rough stone rubble. A strong mortar is then laid on at both sides at the same time, and pressed completely through from the opposite sides, so that the mortar meets and entirely embeds the stone rubble by filling up all the hollows, and with so much body on the surface as to completely cover up and embed the timber and laths.

Walls may be built of *hollow bricks*,* which appear to have many advantages over those in common use. According to Mr. Chadwick, they are superior to the common stone and brick construction,—

In preventing the passage of humidity, and being drier.

In preventing the passage of heat, and being warmer in winter and cooler in summer.

In being a security against fire.

In preventing the passage of sound.

In having less unnecessary material, and being lighter.

In being better dried, and burnt harder and stronger.

In being more cleanly.

In being cheaper.

But however hollow bricks may answer for external walls,

* It has been said that walls formed of hollow bricks are found to harbour insects; but this must be from faulty construction, as there seems no reason why a hollow wall of burnt clay should do so more than a hollow partition of timber and plaster.

It has been proposed to build the external walls of cottages and small houses as thin as $4\frac{1}{2}$ inches with hollow bricks: this is absurd, as no

there can be no doubt of their applicability for inner partitions.

The form represented in the annexed drawing (which may be readily made with any tile machine) might be tried. They might be built up dry, and cement in a liquid state poured in



Fig. 17.—Plan of hollow brick partition.

at the hollow space between them: quarters should be inserted on either side of doorways in angles, and at distances of three or four feet.* (Fig. 17.)

The common quarter partitions, if based on a brick wall, may be rendered nearly fire-proof by brick-nogging them, especially if care be taken to fill in between the joists, over the partitions.

It has lately been proposed to use wire-work (galvanized or japanned to prevent corrosion), the wires being about $\frac{1}{4}$ inch apart, in place of lath, for ceilings and partitions: this plan would of course greatly diminish the risk from fire.

The cheapest and one of the most useful *coverings* for the external walls of houses formed of earth, or indeed of any other material requiring to be covered, and having projecting eaves, is rough-cast. In the process of executing it, the wall is first pricked up with a coat of lime and hair, on which,

materials, however good or carefully put together, can retain warmth and prevent the passage of sound, if built so slightly.

Mr. Loudon is probably correct in fixing the minimum thickness of external walls in this country, for human habitations, at 18 inches: but indeed nothing less than a series of experiments with walls of different materials and different thicknesses can satisfactorily determine these matters. Some singular and unexpected results would probably arise. A little money judiciously spent in making experiments of this kind would be of very great service.

* Their most convenient size and least thickness must of course be a matter for experiment; and the author would take this opportunity of saying that he has had no means of testing the efficiency of this or of any of the contrivances mentioned: they must be considered, therefore, merely as suggestions.

when tolerably well set, a second coat is laid, as smooth as possible: as fast as the workman finishes this surface, another follows him with the rough-cast, with which he bespatters the fresh plastering, and smooths it with a brush, so that the whole dries together. The rough-cast is a composition of small gravel, finely washed, mixed with pure lime and water to a state of semi-fluid consistency.

For inside work, coarse stuff, or lime and hair, is prepared like mortar, with sand; but in the mixing, hair of the bullock, obtained from the tanners' yards, is added to it, and distributed over the mass as equally as possible. Mere laying or rendering is, however, the most economical sort of plastering, and does very well for cottages.

The walls may be coloured while the plaster is wet, on the principle of fresco: the colours, by this method, are fresher and more brilliant than by any other, and may be had at a very trifling expense.

But the commoner sorts of paper being now so cheap,—and with greater simplicity of pattern, and by using but one colour, they might be manufactured still cheaper,—the walls of every cottage living-room, at least, should be covered with it, as conducing so much to the cheerfulness and comfort of the inmates.*

* The great beauty capable of being attained in a paper with but two colours (that is, a ground colour and a different one for the ornament) has been pointed out and illustrated by Mr. Pugin, but apparently to little purpose; for the most expensive modern papers consist of a set of unmeaning patterns, or direct imitations of flowers, animals, parts of buildings, &c., in as many colours as the price of the paper admits of, and commonly without the least regard to harmony of arrangement. Those who are unable to produce a beautiful and harmonious effect by the use of *two* colours, are not very likely to succeed by the use of *ten* or a *dozen*,—the difficulty of producing a fine and harmonious effect increasing in a geometrical ratio (so to speak) with every additional colour employed.

SECTION IV.—FLOORS.

The *Floors* of cottages may be formed in a great variety of ways; the principal, and among the most economical, are the following:

Lime-ash floors are formed in several ways, according to the locality. One of the most approved methods is the following: the sand to be used, after being well washed and freed from earth, is mixed with lime ashes, in the proportion of two-thirds sand to one-third lime ashes, both thoroughly mixed together. It is then, after being suffered to remain for two or three days, tempered with water, and laid on the ground, or other surface to be covered, to the depth of about 3 inches. In two or three days it becomes sufficiently hard to bear treading on, and is then beaten all over with a wooden mallet, till it becomes perfectly hard, using at the same time a trowel and a little water to render the surface as smooth as possible. These floors are very durable, having been known to last for a number of years without needing any repair.

Another and very economical mode for ground floors is to lay on a hard and well beaten foundation, clean gravel, sand, lime, and tar, forming a *concrete*, and covering this with an inch and a half of good cement, composed of one part of cement to three parts of sand, carefully floated and trowelled. These floors require to be executed with great care.*

In using plaster or stucco for the upper floors, broad battens, or reeds, are laid on the joists (hoop-iron in lengths to stretch from wall to wall, would perhaps be found better): the upper surface or floor of plaster is then laid and finished as above described, and the ceiling completed between the joists. If the hoop-iron is quite straight and flat, and

* The above modes of forming plaster floors are given from a variety of methods practised in various places: many more might be mentioned, all said to be equally good and lasting; but without a trial there is no way of testing their merits, or of judging which is the best.

nailed here and there to the joists, close together, no plaster ceiling need be required, the under side being painted. (Fig. 18.)

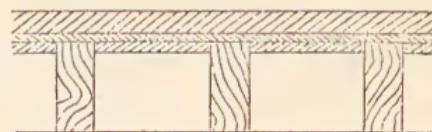


Fig. 18.—Section of plaster floor.

Asphalte has been much employed of late for the flooring of barns and outbuildings, as well as for pavements, roofs, &c.; but does not appear to have been much used in cottages, for the floors of which it would seem to be admirably adapted, at least for rooms on the ground floor. It is laid down in the following manner: on a dry foundation a layer of gravel or small stones is laid, upon which the asphalte, in a boiling state, is evenly spread to a thickness of about 2 inches, being at the same time carefully pressed down and smoothed: very small stones are then sifted over, and pressed down on it.*

As one principal object in the formation of floors in cottages on the ground story is to insure their dryness,† a method said to be practised in Bengal would seem to be very suitable in

* According to Dr. Ure, an asphalte equal to the natural kind is made by mixing boiled coal tar with powdered chalk or bricks.

† The importance to health of living in a *dry* habitation is thus shown by Captain Murray, R. N., in a letter to a distinguished medical practitioner in Scotland. He says that he succeeded in bringing back to England the whole of his ship's crew without even one sick, after having passed two years among the icebergs of Labrador, and having gone from thence to the coast of Caraccas, and afterwards visiting the whole of the West India Islands and other places,—a severe trial to the constitutions of his men in climates usually fatal to so many Europeans. And this he attributes principally to the *dryness* of his ship, to his having every part of it scrubbed daily with hot sand and holy-stones, and to the employment of Brodie stoves, which were constantly used until every appearance of humidity vanished. He says, “I am quite satisfied that a dry ship will always be a healthy one in any climate.” This, of course, must apply equally to houses. To insure dryness, therefore, as much as possible in places where the ground is low and damp, an artificial platform may be formed with dry brick or other rubbish, 18 inches or 2 feet above the level of the ground, and on this the cottage should be built.

places where pottery is cheap. The earth of the room to be floored is made hard and level, and unglazed *earthen pots*, about a foot in height, are then placed with their mouths downwards, and close together, over the whole surface: the vacant spaces between the pots are then filled in with pounded charcoal, and over the whole a floor is formed of coarse brick-dust and lime, well worked together. Common flower-pots would answer the purpose, as in the figure, but they would be better if made with a ledge, *a a*, and thereby offer a much firmer resistance to the pressure above than the mere edge of

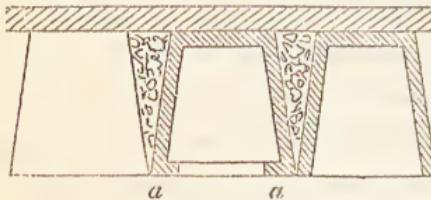


Fig. 19.—Section of a plaster floor.

the pot. The space between the pots may of course be filled in with any kind of dry rubbish, (charcoal being expensive,) and the floor formed of lime-ash, as is above described. (Fig. 19.)

A still firmer floor, and one needing no cement covering, might be formed by using *hexagonal pots* with a rim, as above mentioned, and a groove and tongue, which would bind the whole together, rendering any cement unnecessary. On a hard foundation the under rim might, perhaps, be dispensed with. (Fig. 20.)

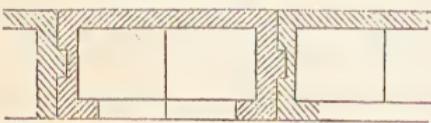


Fig. 20.—Section of a floor formed of hollow pots.

The entrance porch, lobby, kitchen, wash-house, &c. may be paved with *brick on edge*; and in the better sort of cottages, with ornamental *tiles*, set anglewise or square. These tiles may be considered to make the best sort of floors for cottages, as they are hard and nearly indestructible, readily cleaned, and remove all danger from fire. To their use on the ground floor there can be no objection but expense, and this would to a certain extent be removed by their more general use. They might also be readily employed in the upper floors by laying them on longer tiles, as seen in the drawing, and bedding them in cement, in the same way as the common plain tile floors are constructed. If only these latter are used, two

courses would be enough for a bearing of two feet from centre to centre of the joists. (Fig. 21.)



Fig. 21.—Section of tile floor.

The upper floors of cottages have lately been executed of arched *brickwork* in mortar. The arches (in one case) were seven feet span, and turned in half a brick, except at the springing and the skew-backs ; they rose about one inch in every foot in span ; the spandrels were filled in with concrete, and the tile floor afterwards laid with mortar.

Instead of brickwork, arches formed of *hollow pots* have been proposed, which are much lighter.

The annexed drawing represents a section of a *fire-proof floor* formed of iron bearers with brick or hollow pot arches : one or two rods might be necessary to prevent lateral thrust,

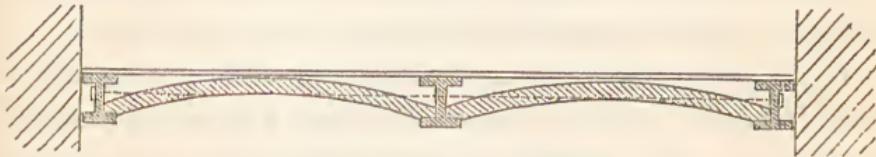


Fig. 22.—Section of fire-proof floor.

and to make the floor perfectly independent of the walls, except where the bearers rest on them. Either a plaster, tile, or wooden floor might be laid on it. (Fig. 22.)

The subjoined engraving represents the opening for the fireplace, with the slab for the hearth and trimming joist ; and instead of an arch in brickwork, as usual, a series of curved tiles. This it will be seen must answer all the uses which the ordinary brick trimmer is supposed to possess, would be neater, and would require much less labour in the fixing. (Fig. 23.)

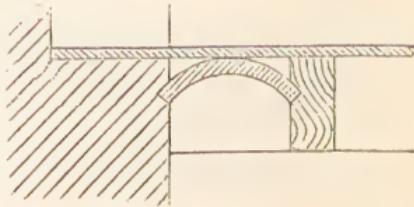


Fig. 23.—Section of tile trimmer.

As the firmness and stability of a brick or stone wall depends so much on its being built without the admission of any

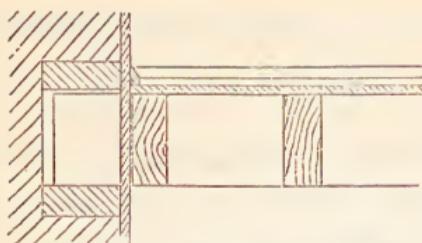


Fig. 24.—Section of girder floor.

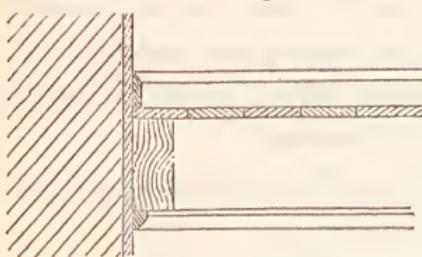


Fig. 25.—Section.

other material, such as wood for plates, &c., and on its having as few points as need be for the support of the floors, a great improvement would be effected by employing girders, as in the figure, from wall to wall, and tenoning the joists into them. This would reduce the supporting points to four in number, and would entirely obviate the necessity of wall-plates. (Figs. 24 and 25.)

The figures also show the skirting-boards or fillets with the plastering brought down to the floor-boards, and carried through, thereby forming a perfect key, and at the same time leaving no hollow space for harbouring vermin and dust.

In connection with the floors, and fire-proof construction (a most important point in cottage building),* the *Stairs* may be mentioned. As commonly constructed, the hollow space formed by the tread and riser is enclosed by a flat plaster

covering or ceiling, having a most unsightly appearance, and rather aiding than preventing their destruction in case of fire.

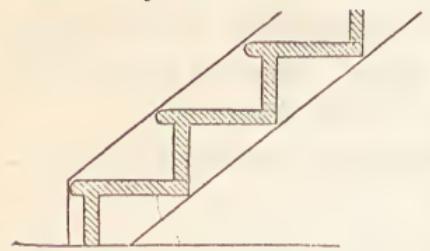


Fig. 26.—Section of stairs formed of tile.

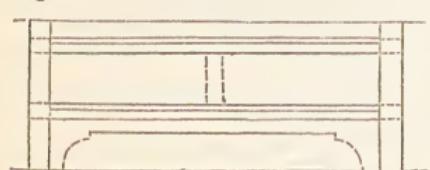


Fig. 27.—Elevation.

The engraving shows the bearers of wood, but the tread and riser of earthenware, to be formed in one piece for strength. Stairs thus formed would be fire-proof, and would have a neat appearance. (Figs. 26 and 27.)

* Every cottage ought, as far as possible, to be fire-proof, as, if burnt down, not only the landlord or Fire Insurance Company suffers, but the cottager is probably ruined by losing all his household furniture and working tools.

SECTION V.—ROOFS.

The *Roofs* of cottages may be formed of a great variety of materials, and a number of modes of construction have been invented.

For the humbler kinds of dwellings, *thatch*, though falling into disuse, seems admirably adapted; not only as being cheap, but as being the warmest of all coverings, and less liable to admit the changes of temperature. The objection, its liability to take fire, may be, to a great extent, removed by soaking it in a mixture of alum water and size. It is usually made of combed wheat straw, called reed, consisting of the stiff, unbruised and unbroken stalks which have been carefully separated from the fodder straw by the thrasher. A more durable thatch is formed of the spray of trees, previously well seasoned, hoop chips, and the chips of coppice-wood.

The roofs may be covered with the common *pan* or *plain tiles* in the usual manner, the ridges and valleys being also formed in tile. The ridge tiles should always form a straight line; and a great improvement in the valley tiles would be the making them in long lengths, and forming the necessary fall in the thickness of the tile itself, as in the figures: no gutter fillets would be required, and it would be perfectly weather-tight, especially if where a joint occurs it were set in cement, and the joint formed as in figure 3. (Figs. 28 and 29.)

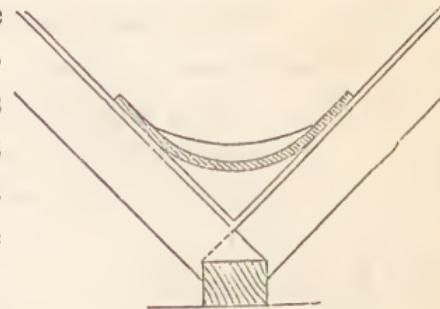


Fig. 28.—Section of valley tile.

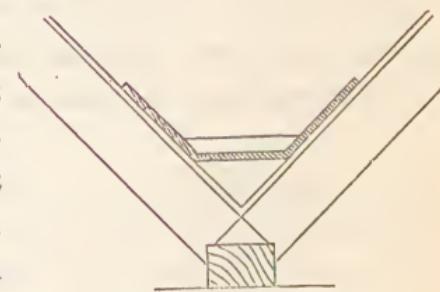


Fig. 29.—Section of valley tile.

The *French roofing tiles*, introduced by Sir John Robison, are square in form, and about 9 inches across, with a raised ledge on two sides. They are laid, with or without mortar,

diagonally, so that the rain-water never hangs to the joints by capillary attraction, but runs to the lower points, and from thence to the flat surface of the next tile. These tiles are lighter than pantiles.

A great variety of *ornamental tiles* (some of them sufficiently fanciful) have of late been manufactured: a better mode of joining them, and one requiring no mortar, is shown in the figure,

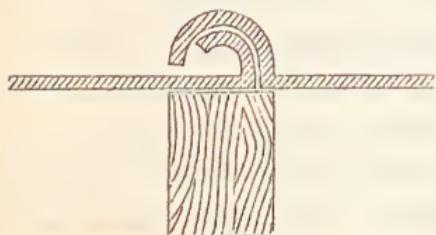


Fig. 30.—Section of roof tile.

as the water creeping in under the edge of the upper tile would be effectually stopped by the curved inner rim, which, by its form, would prevent the water from making its way to the roof timbers. (Fig. 30.)

A very economical plan of covering a roof with *slate* has lately been introduced, as it only takes half the quantity of slates, requires no battens, and, if large ones are used, a less number of rafters. In this plan of covering a roof, the slates are fixed in the same manner as glass in a skylight, but instead of being inserted in a rebate, a fillet of wood is used, about $1\frac{1}{4}$ inch high and 1 inch broad on the top, and $\frac{3}{4}$ inch broad at the bottom: this slip is nailed down the centre of each rafter, and the slate stopped in with putty in the manner above mentioned, each slate having a lap of from 2 to 3 inches. This mode of slating, if carefully performed and kept well painted, will last for a number of years. One objection to it is its extremely slovenly appearance, as not only the line formed by the putty cannot be kept even, but the paint is commonly found smeared half

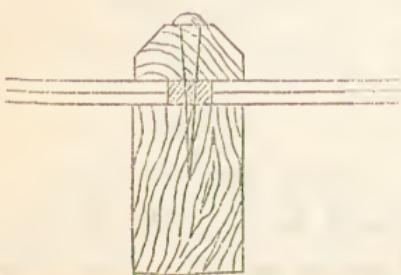


Fig. 31.—Section of slate roof.

over the slate. By forming it as in the figure this is remedied: a strong wooden fillet is nailed over both slates, thereby making a perfectly secure joint, as well as showing a neat appearance. The fillet should be well painted before fixing. (Fig. 31.)

Cast-iron roofing has occasionally been employed for cottages, and *corrugated iron* may be used with great advantage, as no rafters are required, and it can be used in long lengths without fear of bending.

As a slight improvement in these roofs, the method here shown might be adopted. The raised portion would not only greatly strengthen it, and allow the iron to be used in longer lengths, but it would have a better appearance. (Fig. 32.)



Fig. 32.—Section of corrugated iron.

The eaves-gutters, when there are any, are commonly formed of cast iron or zinc,* and have a very unsightly appearance, from the fall not allowing of their being fixed parallel to the line of eaves, besides their liability to sag between the supports.

Of late, a wooden gutter has been used, with the fall formed within its own depth, thereby keeping a horizontal line. The joints should be as few as may be, and where they occur should be carefully mitred. These wooden gutters must occasionally be painted. The same form might be used in tile, as in the figure, in as long lengths as possible, and with the joints formed as above described for the valley tiles. (Fig. 33.)

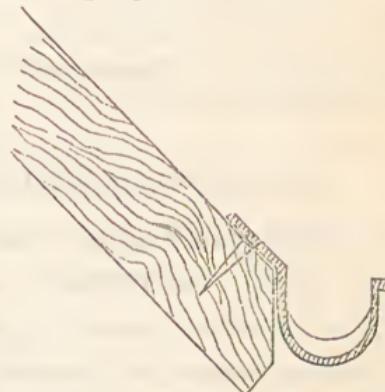


Fig. 33.—Section of tile eaves-gutter.

The angles formed by the chimney-shaft and the roof, as also those formed by the roof and wall, are, in the more expensive houses, covered with lead, which, besides expense, does not harmonize in colour with a tile roof; and in the commoner sort, are merely jointed with mortar or cement,—a very imperfect method, as the weather speedily causes it to crumble

* Sometimes the ridges and gutters of a roof are formed of a substance called marine-metal, so named, apparently, from its wavy appearance and changeable properties when in such situations.

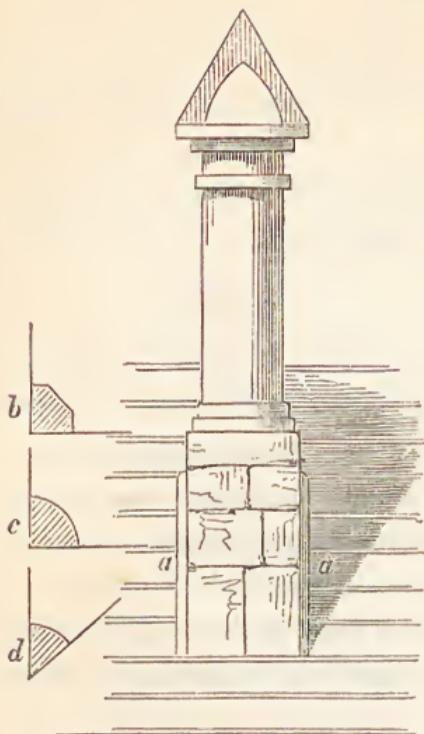


Fig. 34.—Elevation of a chimney-shaft, showing tile angle fillets.

SECTION VI.—VENTILATION AND WARMING.

As economy in materials and construction is absolutely necessary in all that relates to cottage building, any mode of *Ventilation* which could be proposed must be accomplished without an expensive apparatus, and of so simple a nature as to be nearly or quite incapable of derangement.

The prejudice in favour of an open fire being so great, it is imperative in all cases to provide for it; and as it always makes the largest demand on the air of a room, it should be separately supplied, so as to be perfectly independent of doors and windows.

The best way of doing this, at least in cottages, is to connect each fire-place with the outer air by means of a flue-tube

* Tiles of this form, made circular on plan, might be used with advantage for setting the common chimney-pots, instead of the unsightly mass of mortar usually cobbled round them.

away, and it then becomes necessary to renew it, and is continually a source of trouble and expense.

By using a tile fillet of the shape indicated in the figure, and set in cement, a perfectly secure and water-tight joint would be formed, having a very neat appearance. It is here represented in elevation at *a a*, and the figures *b*, *c*, *d*, show different forms of tiles.* (Fig. 34.)

at the level of or under the floor, opening out just above the ground surface, and admitting the air behind, or at the side of the grate. The tube may be either formed in the brickwork itself, of metal, or of earthenware. Both the external opening and the opening into the fire-place should be closed by a grating.

This mode of supplying the fire with air would (from experiments made by Mr. Hosking) also supply the room as well with a sufficient quantity of fresh and tempered air for all purposes; the more especially as, according to Dr. Arnott, a sufficiency of fresh air always enters a room by the spaces left in consequence of the imperfect closing of doors and windows, and the occasional opening of the door.

In most cases where attempts are made to ventilate rooms, the fresh air is admitted by an opening connected with the outer air, and at the level of the floor, through the skirting,—a very imperfect method, not only as being dirty, the air collecting dust as it passes, but as creating a draught along the floor in its passage to the opposite opening. By admitting the air through earthenware tubes, at about seven feet above the floor, or just above a person's head, both these sources of annoyance and discomfort would be avoided; the clean earthenware tube would be free from dust, and the cold air would mix with the warm air in the room above the head, and could not therefore be felt as a draught; and as the fire is supplied separately, no down current would be likely to take place.*

The vitiated and heated air in each room may be carried off by the chimney-flue, through an orifice just below the ceiling, fitted with one of Dr. Arnott's chimney-valves or some similar apparatus, or even by a simple opening.†

* In houses of two or more stories, it would be better to draw the air for the supply of the fire, and also for ventilating the rooms, from the staircase, the air in it being warmer than the external atmosphere; and it would at the same time be itself ventilated, means being of course provided in it for the admission of a sufficient quantity of fresh air.

† When it is proposed to let the foul and heated air escape through an aperture close to the ceiling, it is on the supposition that the foul and

Where the draught in the flue is insufficient, and a cowl or other contrivance is needed, a simple apparatus, as is here

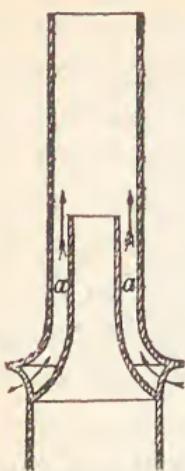


Fig. 35.—Section of chimney-funnel.

shown, might answer the purpose. It consists of an inner tube for the passage of the smoke, and an outer one as an air-flue: the space *aa* is open all round, having only enough metal to support the outer tube firmly: the direction of the current of air caused by the wind is represented by the arrows, thereby creating a draught and carrying the smoke up with it.* (Fig. 35.)

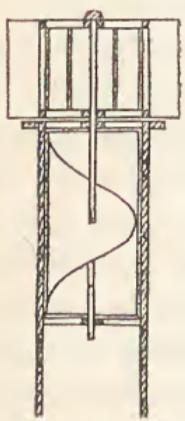


Fig. 36.—Section of chimney-funnel.

Another plan is here shown: it consists of a metal or other tube, inside of which is an Archimedean screw, turned by a wind-vane (shown more clearly on the plan); and so long as the force of the wind is great enough to turn the screw, a continual up-draught or current of air would result. Whether the

heated air *ascends*. The laws of Nature are usually considered to admit of no exceptions: this is, however, an error. In the neighbourhood, and inside the Model Prison, heated and foul air is found to descend, and accordingly, with admirable wisdom and forethought, the ingenious contriver of that edifice has provided holes close to the floor, through which he supposes the hot air to pass, the colder and fresh air being admitted through apertures near the ceiling! The resources of old age and science are truly wonderful, and at times unfathomable.

* A somewhat similar apparatus is already in use, but it differs from the above in having the external tube of exactly the same height as the inner one. How it is supposed to act cannot be learned: it is called the 'Himalaya funnel,' and operates, it is believed, on those mountains.

screw, when not in action — as in perfectly calm weather — would oppose in any inconvenient degree the passage of the smoke, can only be determined by experiment: if it did so, it

would of course be inapplicable to smoke-flues, but it might still be useful for ventilating rooms and staircases.* (Figs. 36 and 37.)

A great desideratum in the cottage is a cheap *cooking-stove*, and one that shall burn inferior fuel. What are usually called cottage cooking-stoves are common in Holland and the Netherlands, but from various causes are little used in England. Of these the Bruges stove appears to be the best adapted both for warming a cottage and for cooking; it consumes the most inferior description of fuel, and that perfectly, as it is a furnace, the fire-box being completely enclosed.

But the great objection to its more general or indeed universal adoption, besides expense, is, that like Dr. Arnott's stove, the fire is invisible; and as the prejudice in England is so great in favour of an open fire, any form of stove, however perfect in its action, where this is not the case, would stand little or no chance of adoption.

The engraving represents a proposed modification of the above stove, combining, to a certain extent, these advantages; it might be used in the cottage kitchen, where the open fire would be less cared for. It is shown in section in the figure, where *a* represents the fire-box; *b*, the space for the passage of smoke; *c*, the chimney-funnel; the holes, *d d*, are for a kettle and saucepan; and when

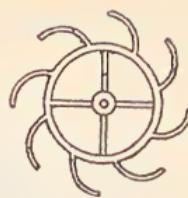


Fig. 37.—Plan.

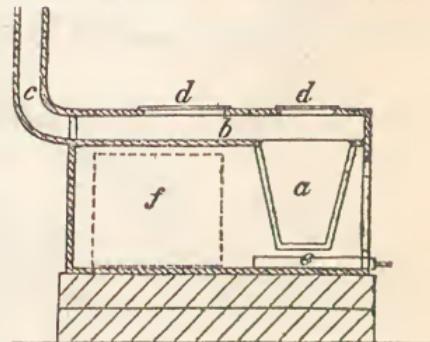


Fig. 38.—Section of cottage cooking-stove.

* The Archimedean screw has been applied for the purpose of ventilation before, but only as turned by machinery.

not in use for these purposes they are covered by iron lids :

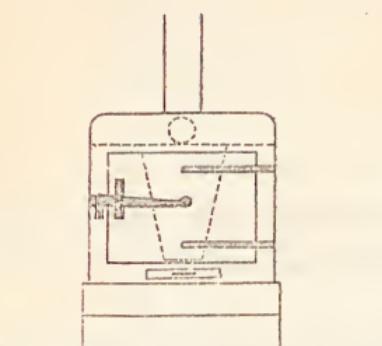


Fig. 39.—Elevation.

e is the ash-box, the distance to which it is drawn out regulating the draught, and *f* the space to be used as an oven. The elevation represents the stove as seen in front, standing on a basement of brickwork ; it shows the front of the ash-box and also the door, which could at all times remain open when

the stove is not in use for cooking purposes, the fire then burning as in a common grate. (Figs. 38 and 39.)

This modification of the open and the close stove might, perhaps, in time remove the prejudice that exists against the latter : its perfect action and economy of fuel, when closed, would soon be discovered, and the determination not to use it at all might be removed by opening the door and using it as an open stove.

An economical mode of forming the living-room *fire-place* and *stove* is shown in the annexed drawings. The chimney jambs, arch, and back, are formed of bricks glazed on the outer surface, which would have a very neat and clean appearance. The plan shows the back of the fire-place as circular, with the grate placed as far forward and as nearly in the focus of the reflecting surface as possible. The chimney mouth

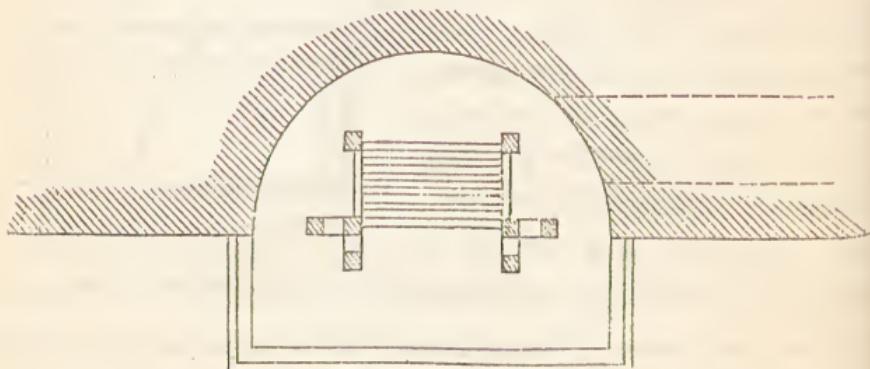


Fig. 40.—Plan of cottage living-room fire-place.

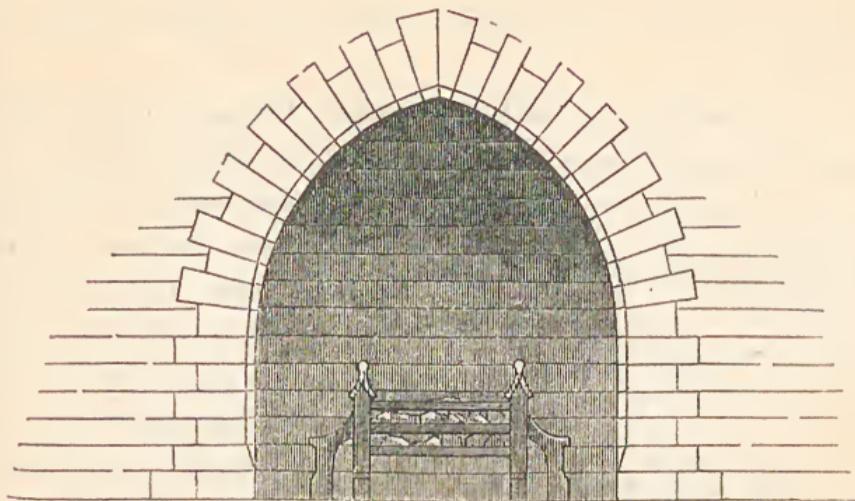


Fig. 41.—Elevation.

should be small, and provided, where the cost will allow of it, with a register flap to regulate the draught. The dotted lines in the plan show the course of the air-flue. The fender may be formed of stone or earthenware. The grate is shown of a simple construction, and may be rendered still more so by forming the supports or sides of brick or tile. (Figs. 40 and 41.)

In connection with ventilation and purity of air, it may be remarked, that a *food-safe* is a most important fixture in a cottage, and should never be omitted. Poor people are apt to leave food lying about, unless there be a place at hand for its reception ; and nothing tends more to vitiate the air in a room. The safe in the figure is shown as a close box, fixed to the wall, but open on one side, and having a door on the other, and enclosing a window fitted with an iron grating or perforated zinc plate. A safe thus constructed would keep all articles of food sweet,

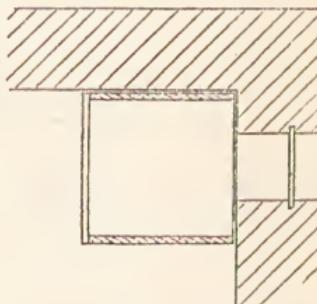


Fig. 42.—Plan of safe.

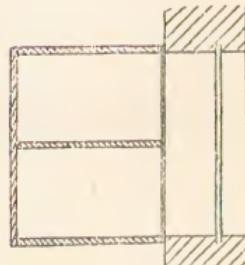


Fig. 43.—Section.

and prevent any smell from entering the room. (Figs. 42 and 43.)

In connection too with ventilation, the *door* and *window fastenings* and hinges may be noticed: at present, those used

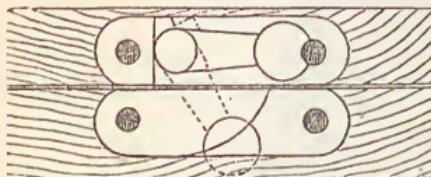


Fig. 44.—Plan of window-fastening.

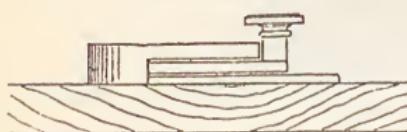


Fig. 45.—Elevation.

for the commoner sort of houses and cottages become useless after the wear and tear of a month or two; and the reason seems to be, that they are the cheapest and smallest copies of the more expensive ones used in better work. For cottages, things of this kind cannot be

too simple. The drawings re-

present a simple and inexpensive form of window-fastening, the immovable spring and small rusty iron wheel being omitted. (Figs. 44 and 45.)

PLATES.

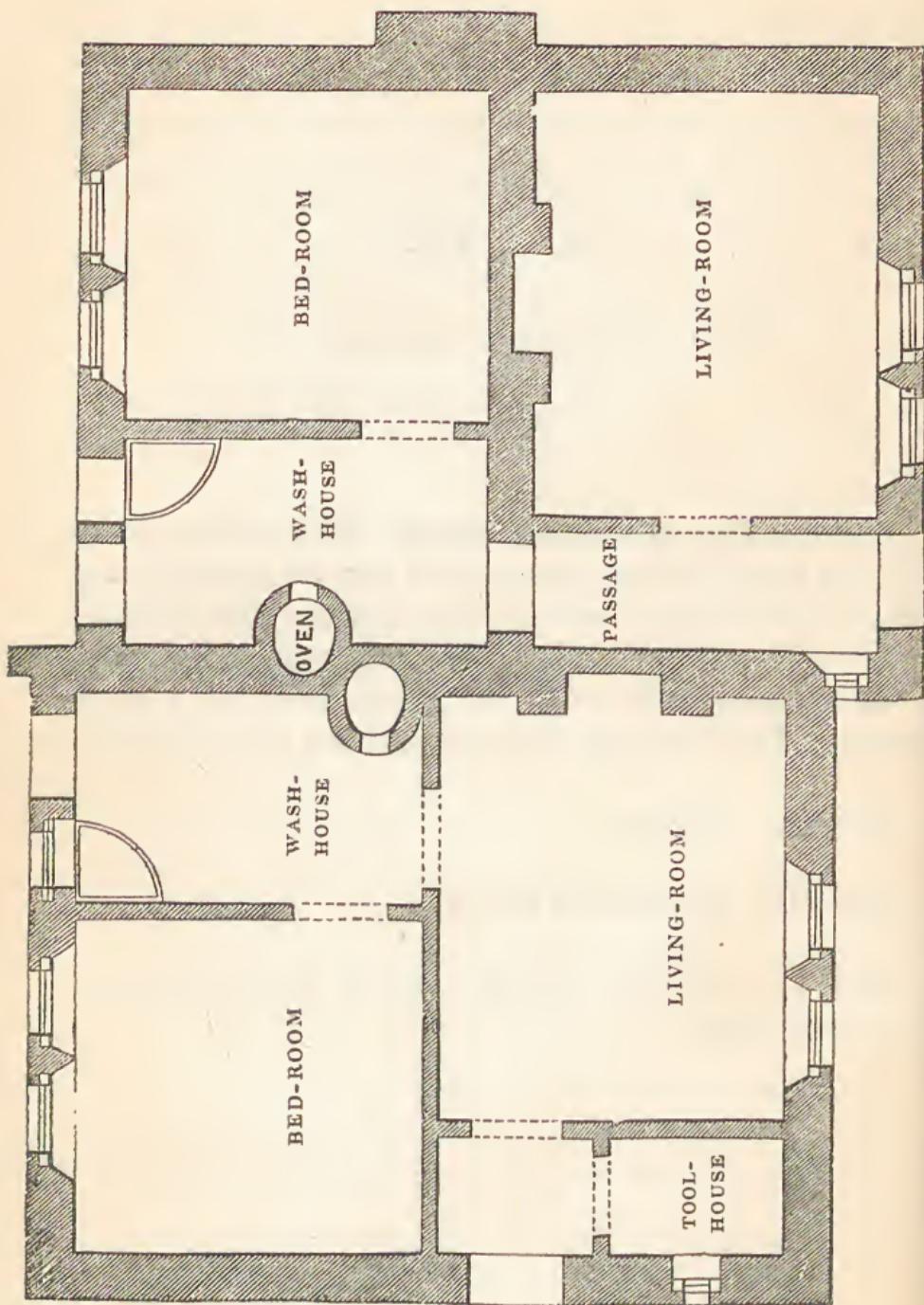
PLANS, ELEVATIONS, SECTIONS, ETC.

Plate I. Plan of a double cottage. Each cottage shows the least accommodation which should exist for a man and his wife, without children, and contains an entrance lobby, a living-room with a fire-place and two dwarf cupboards, a bed-room, a wash-house with an oven, and a safe, sink, and a small dresser. The privy, fuel store, and dust bin, are at the back.

Plate II. Elevation.

Plate III. Longitudinal Section.

Plate IV. Entrance doorway, window, and chimney-pot, to a larger scale.



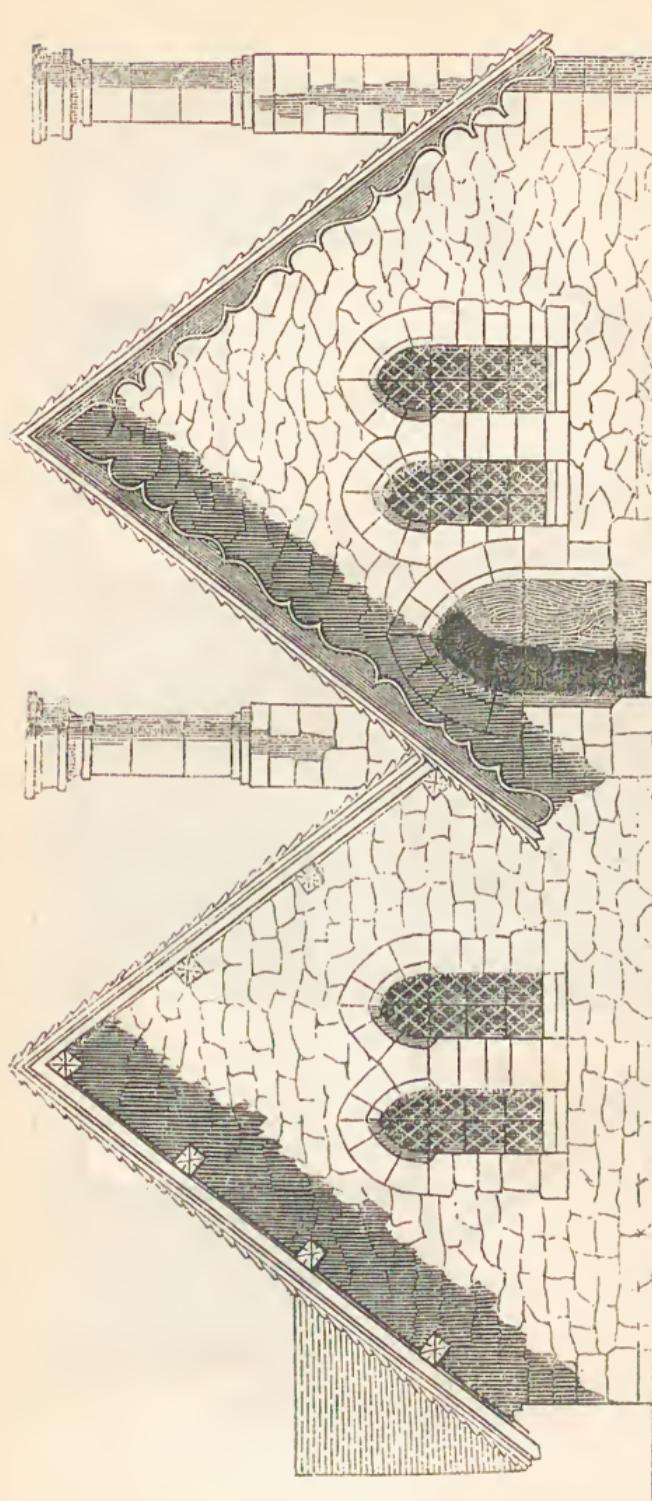


Plate II.

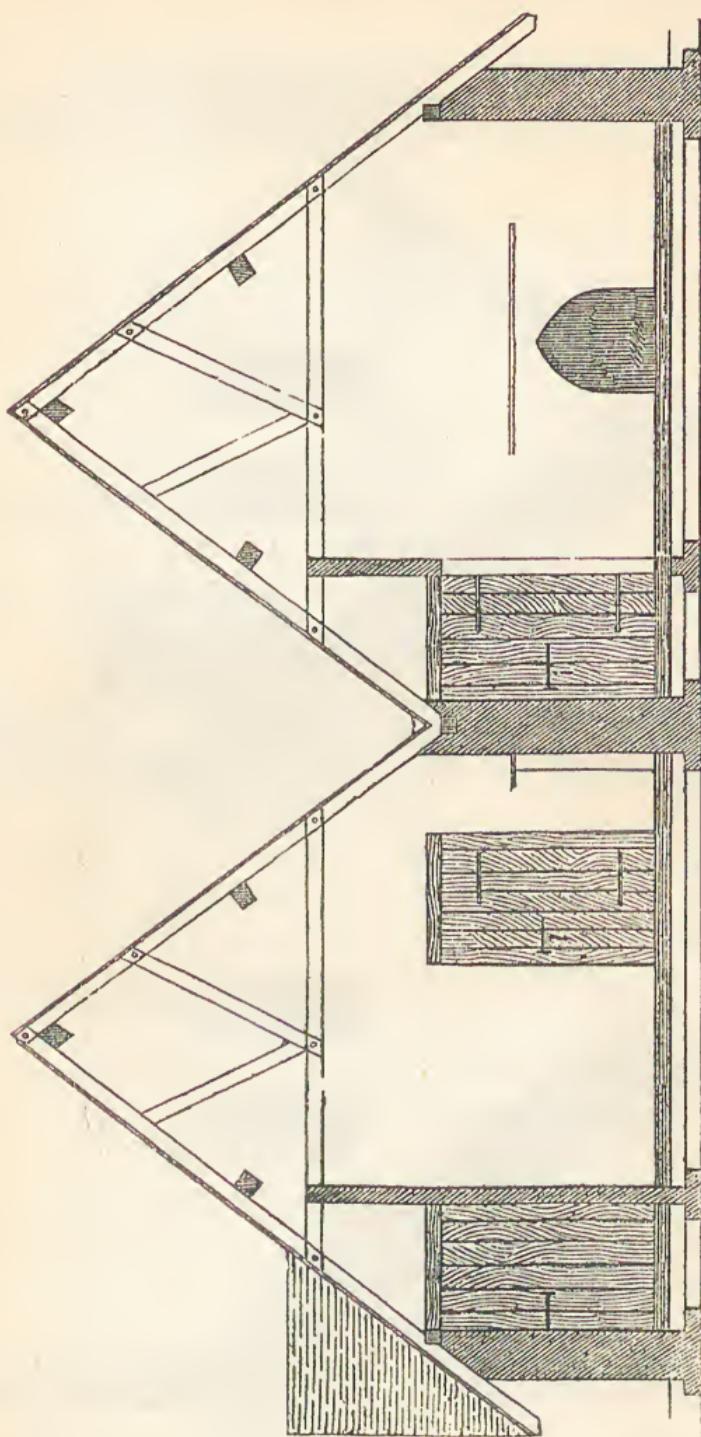


Plate III.

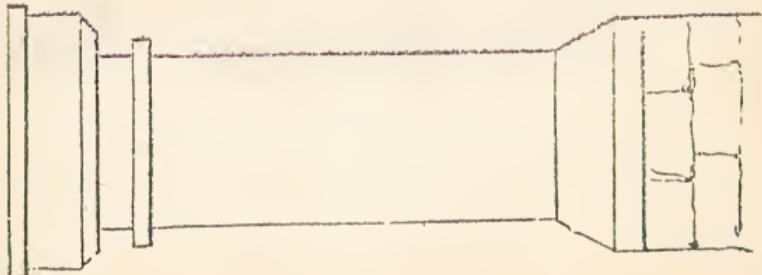
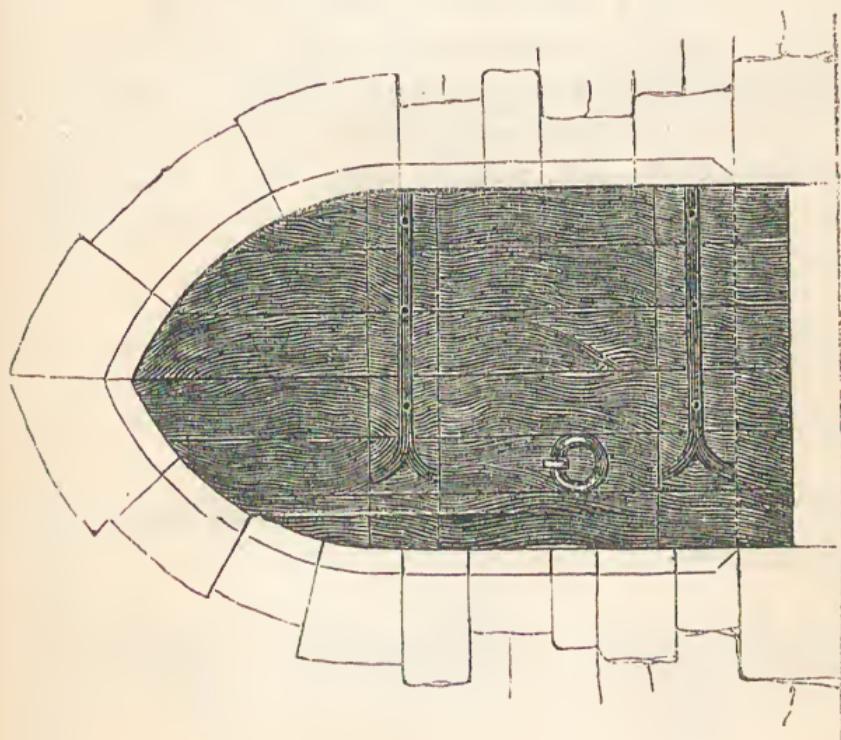
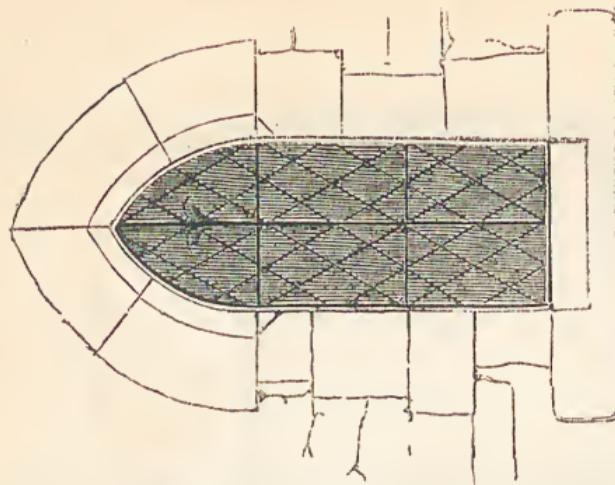
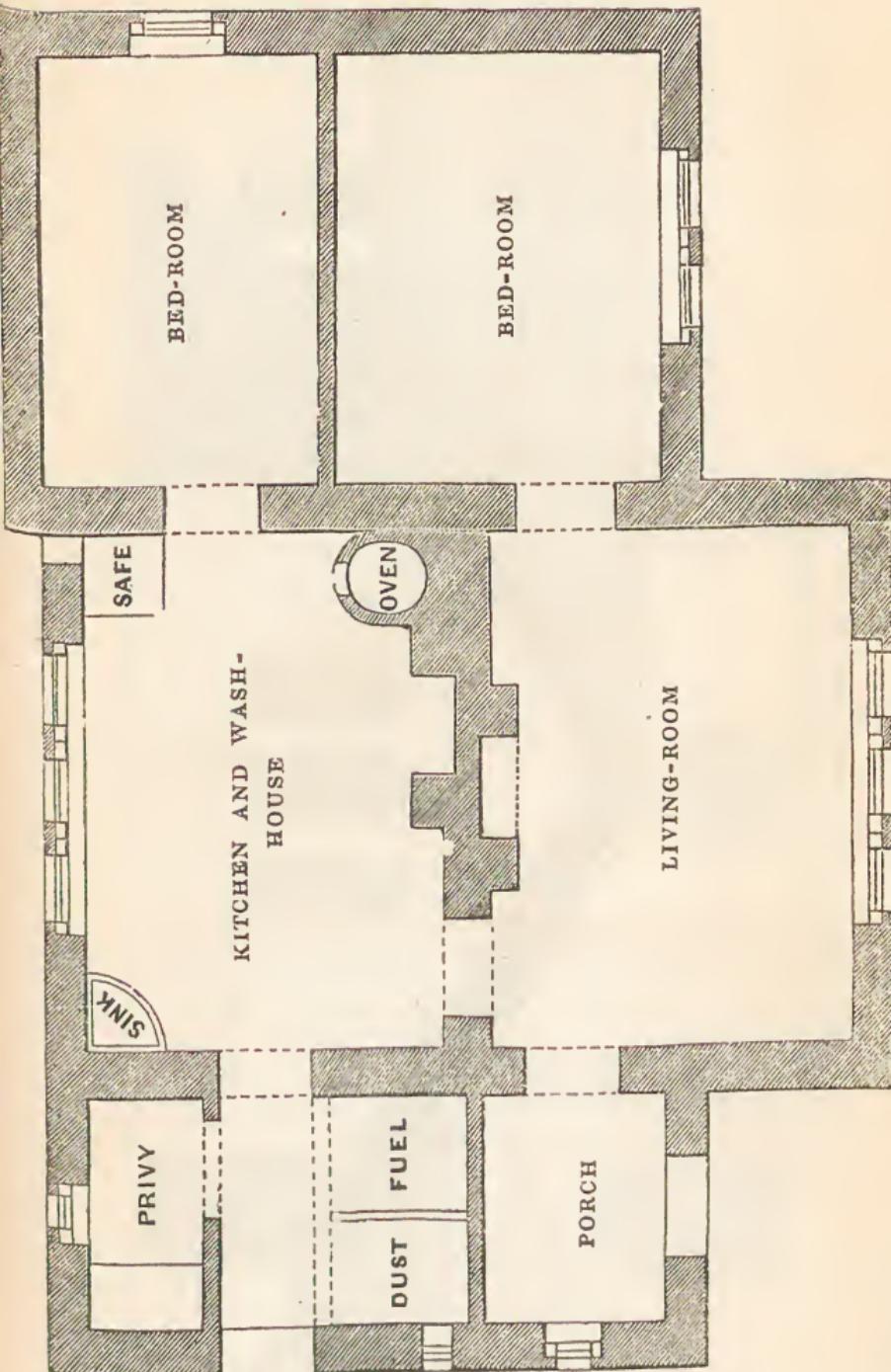


Plate V. represents a plan for a single cottage, with accommodation for a man and his wife, with three or four children. It consists of an entrance porch (in which agricultural and other implements may be kept), a living-room with a fire-place and dwarf cupboard, a kitchen or wash-house with a fire-place, oven, sink, safe for food, and a dresser with shelves above, two bed-rooms, a privy, and a dust and fuel house.

Plate VI. Elevation.

Plate VII. Longitudinal Section.

Plate VIII. Entrance doorway, window, and chimney-pot, to a larger scale.



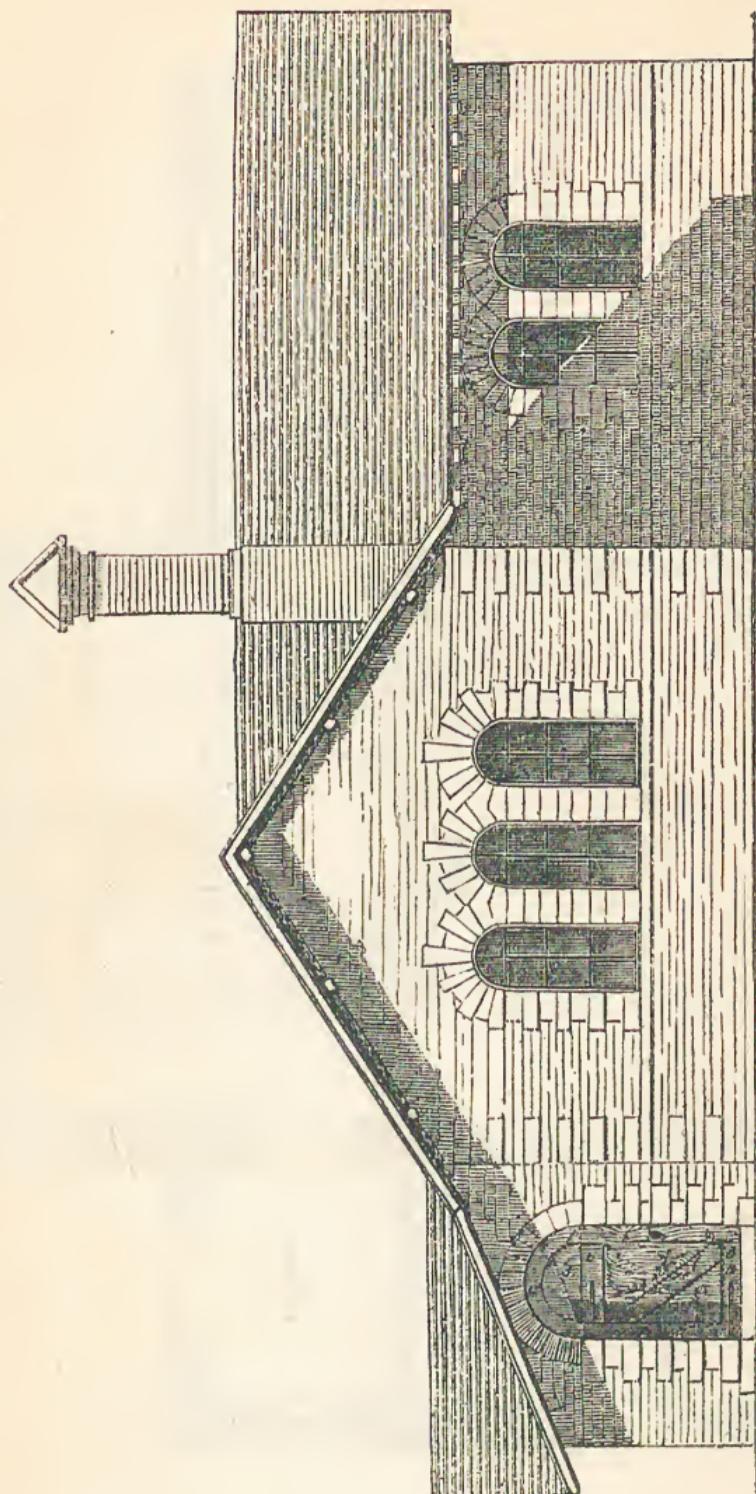


Plate VI.

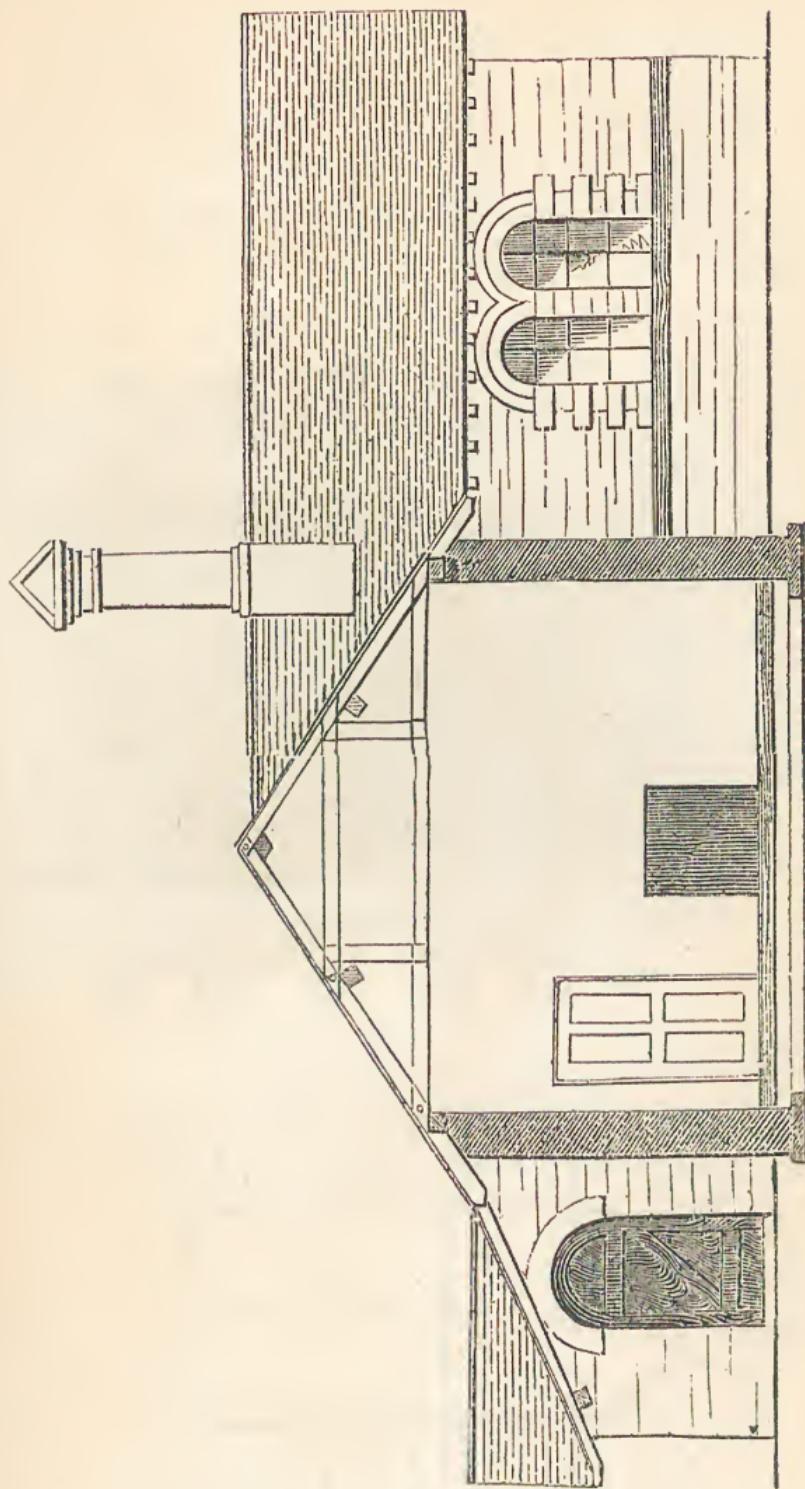


Plate VII.

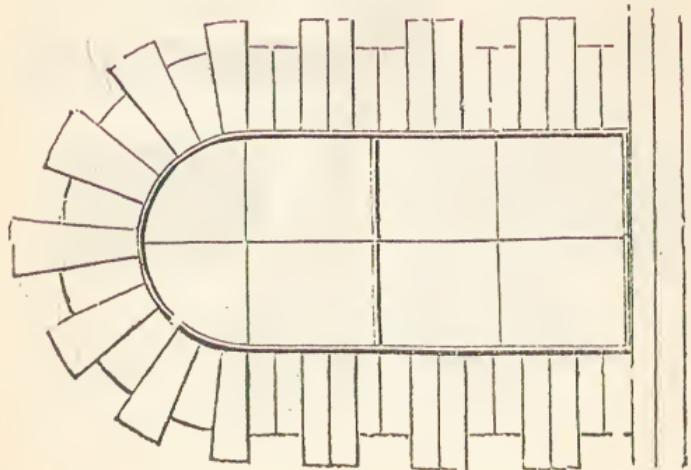
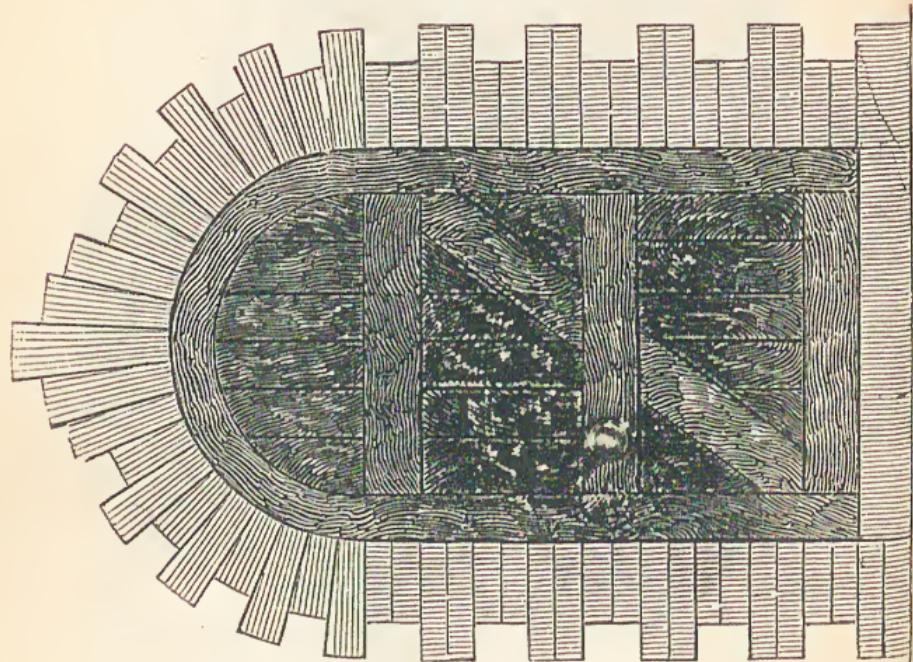
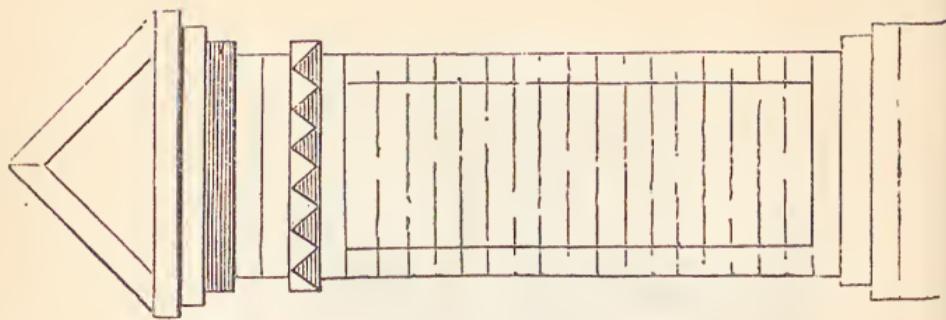


Plate IX. A ground plan of a two-storied cottage, with accommodation for a man and his wife, and five or six children. It contains on the ground floor, an entrance passage in which are the stairs to the upper floor, a living-room, wash-house, kitchen, dairy, privy, and a dust and fuel house.

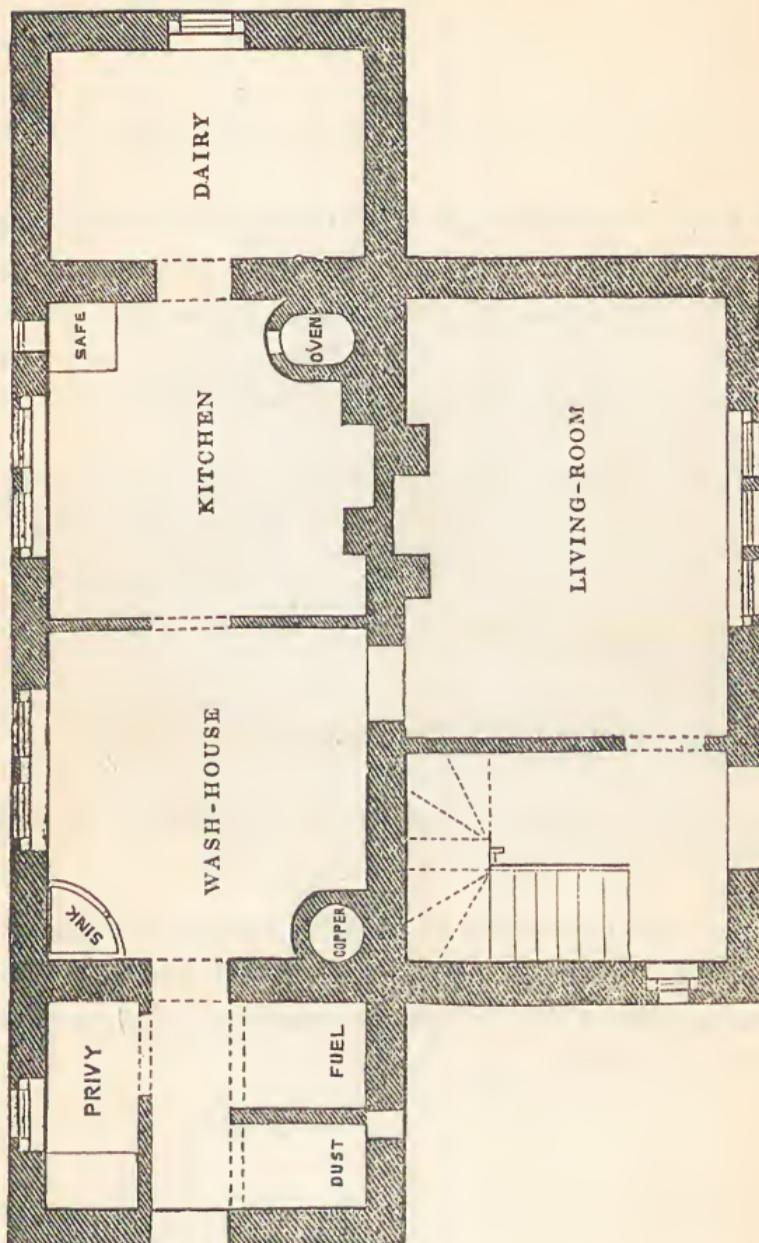
Plate X. is a plan of the upper story, and contains three bed-rooms, the larger one for the man and his wife, and the smaller ones for the boys and girls.

Plate XI. Elevation.

Plate XII. Longitudinal Section.

Plate XIII. Entrance doorway and window, to a larger scale.

The plan lately proposed of dividing the upper rooms into compartments for single men, — the ground floor to be kept by a man and his wife, — might be readily adopted here, and in all houses having an upper floor.



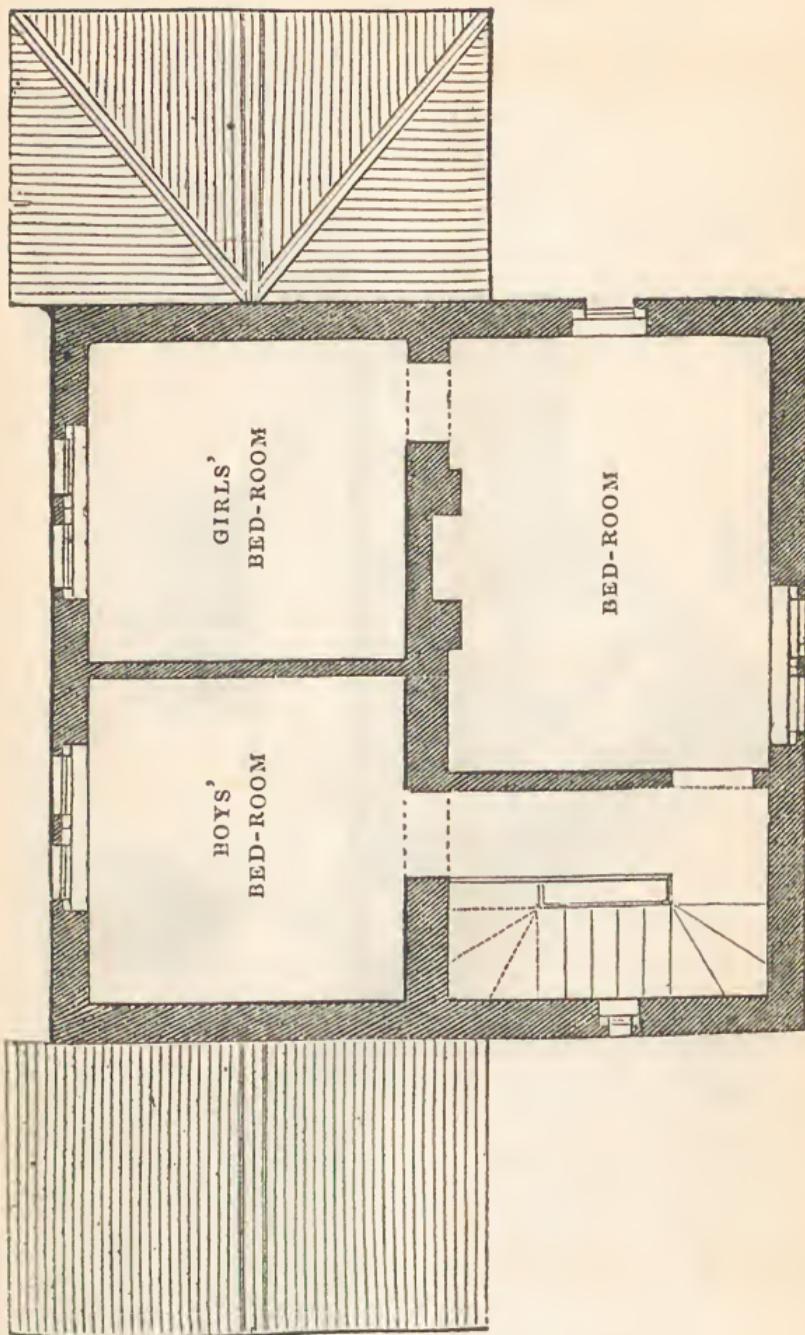
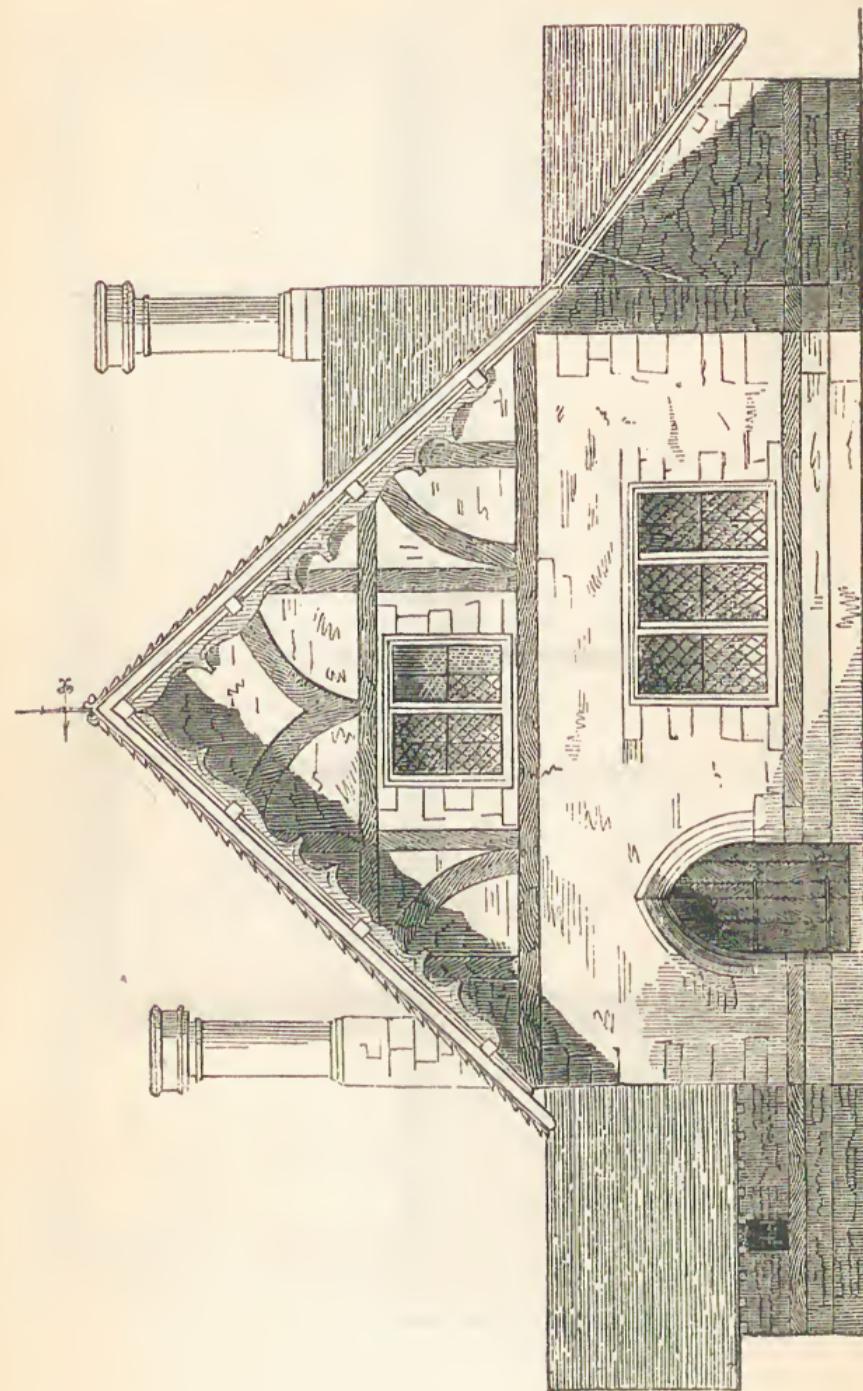


Plate X.



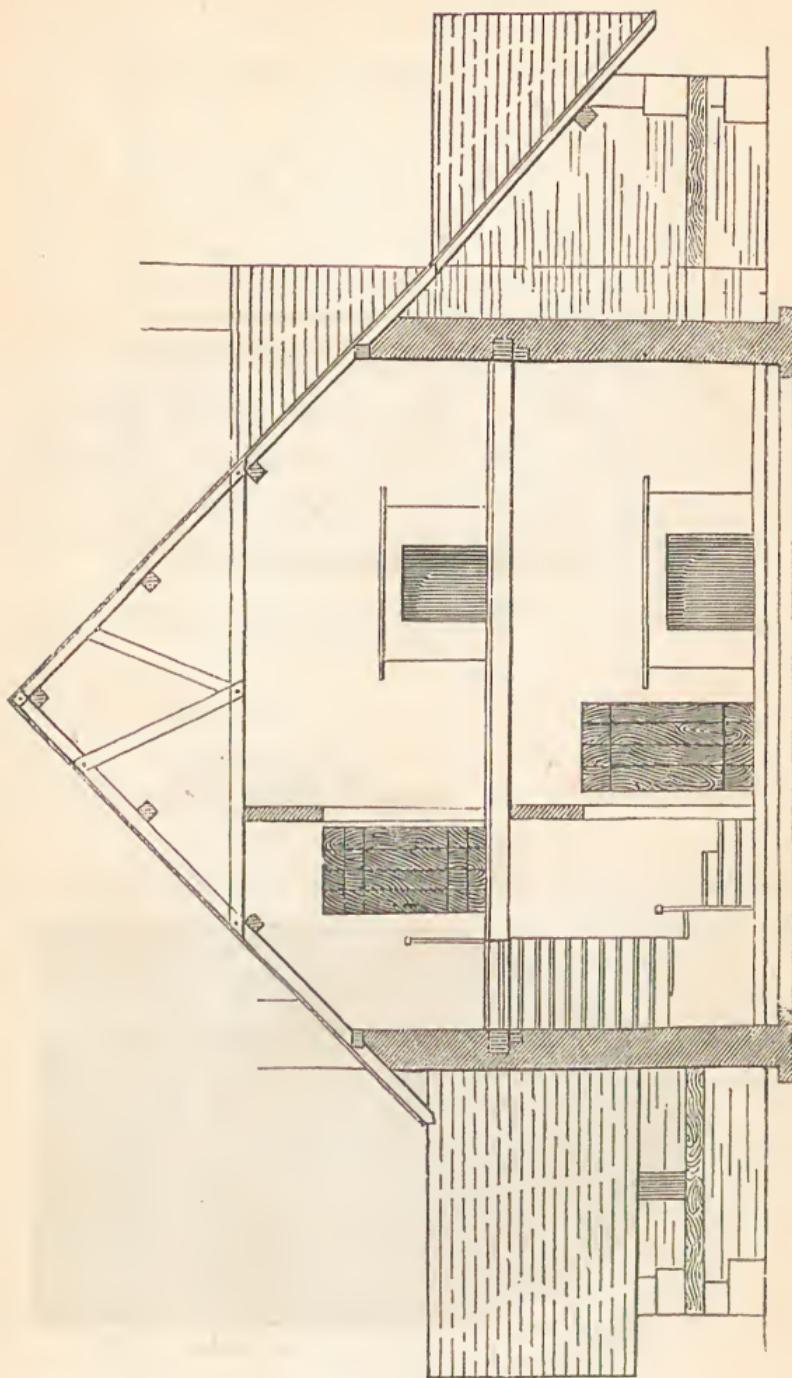


Plate XII.

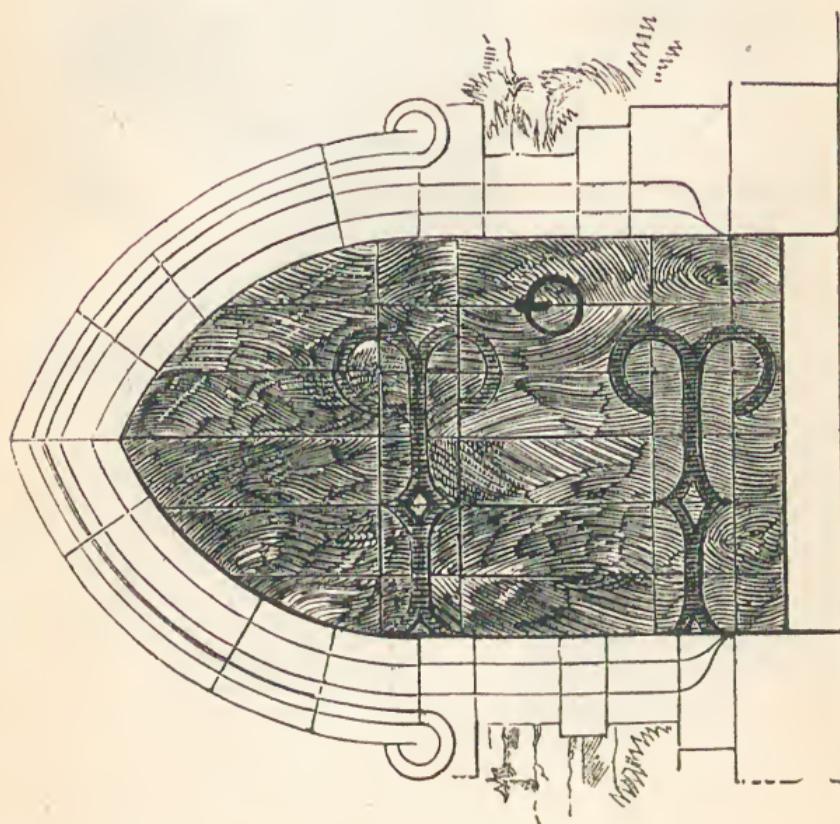
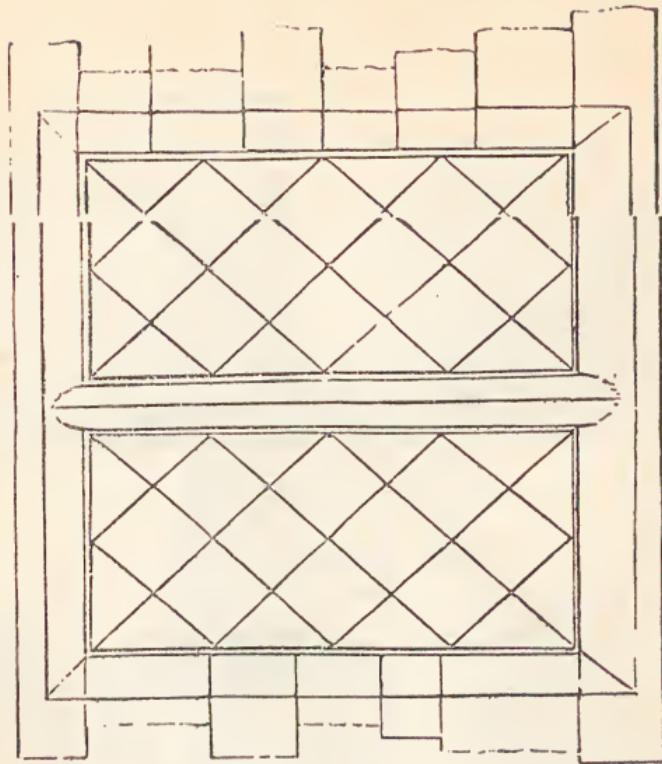


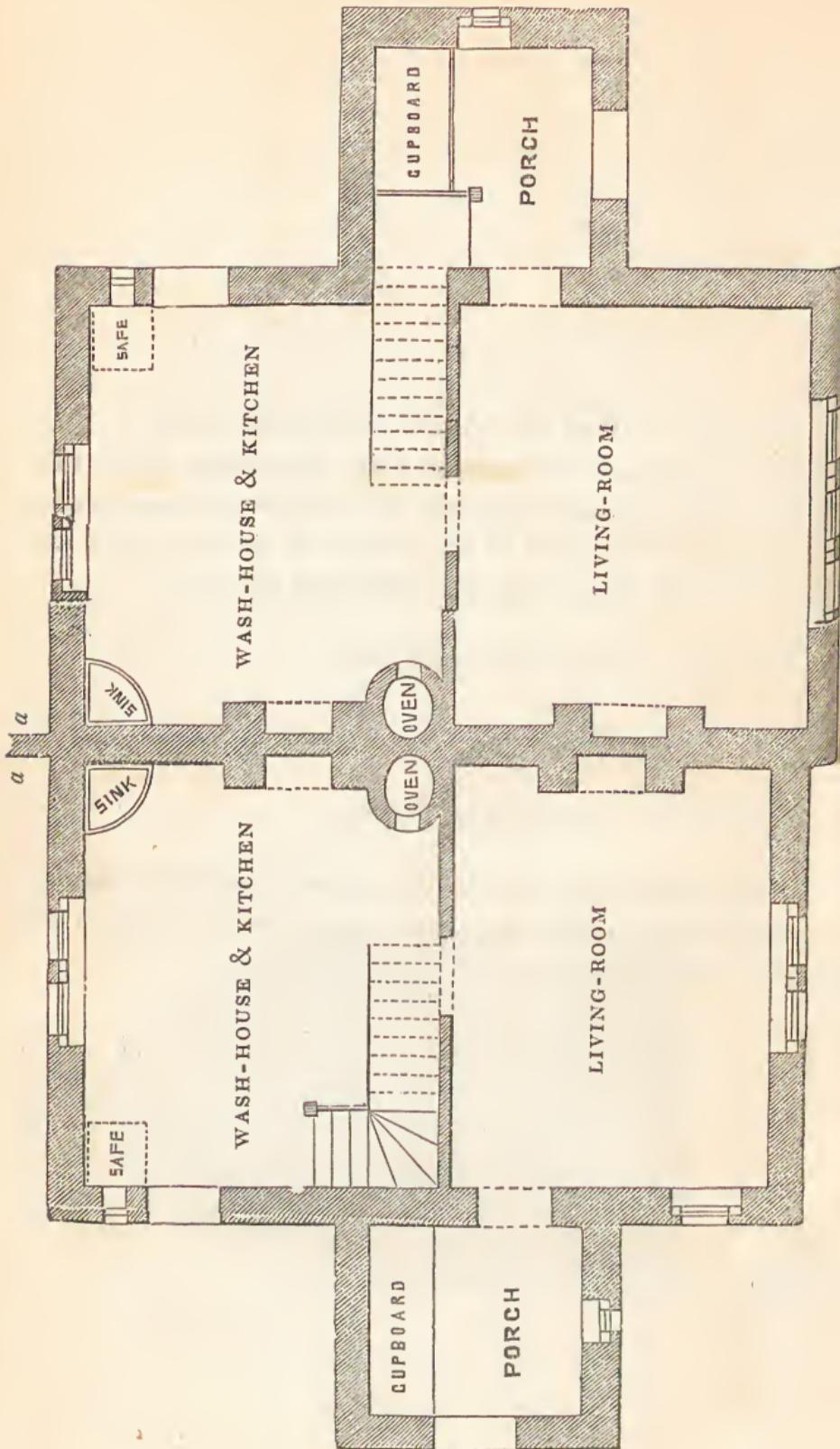
Plate XIV. Plan of a double two-storied cottage. Each cottage contains, on the ground floor, an entrance porch with a large cupboard, a living-room, and a kitchen or wash-house, in which are the stairs to the bed-rooms (to save room and expense) : the privy, fuel, and dust house are at $\alpha\alpha$.

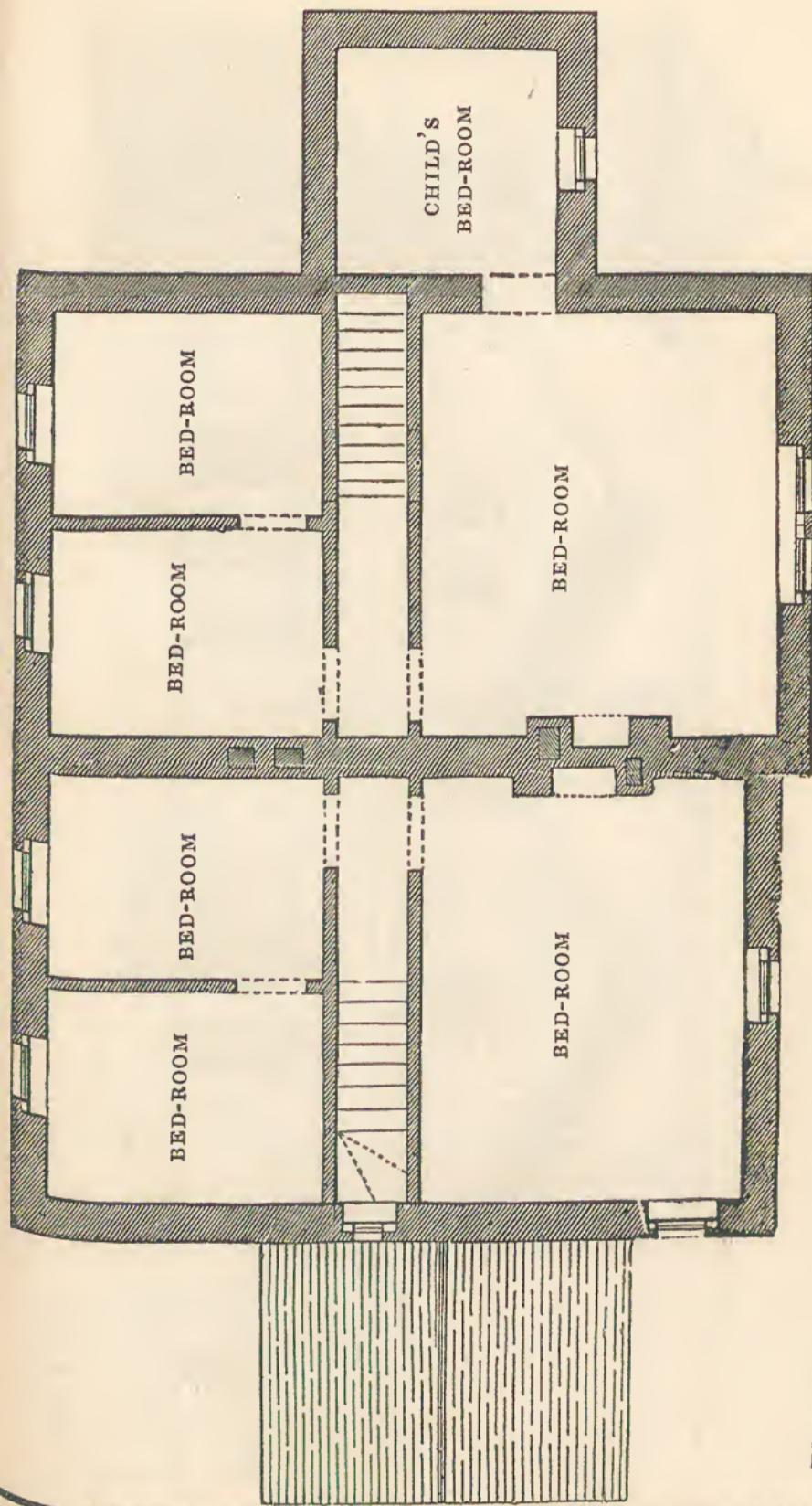
Plate XV. Plan of the upper story.

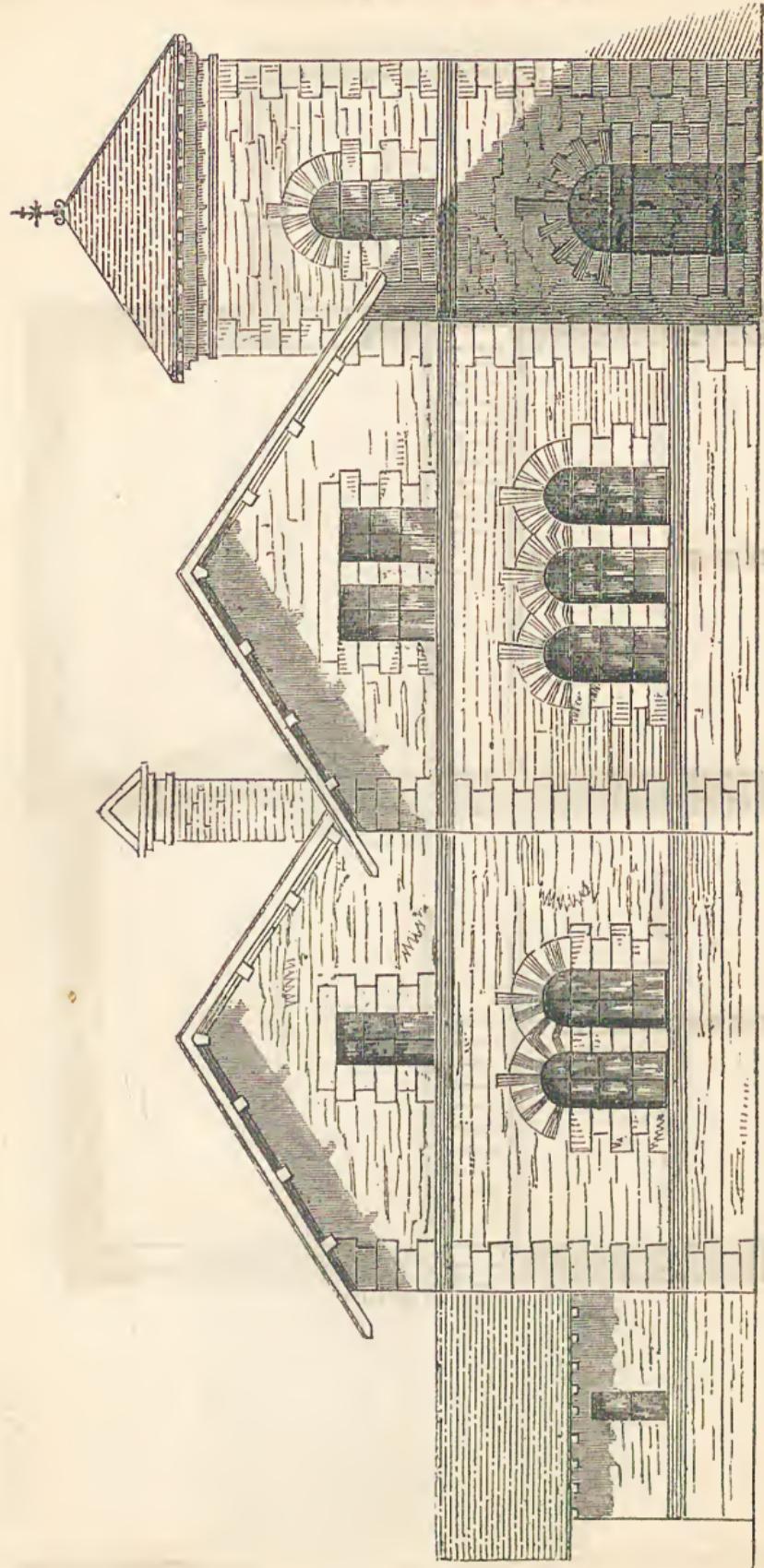
Plate XVI. Elevation.

Plate XVII. Longitudinal Section.

These cottages are intended for the better sort of mechanics, foremen, farm bailiffs, &c., and would be well adapted for small retired tradesmen.







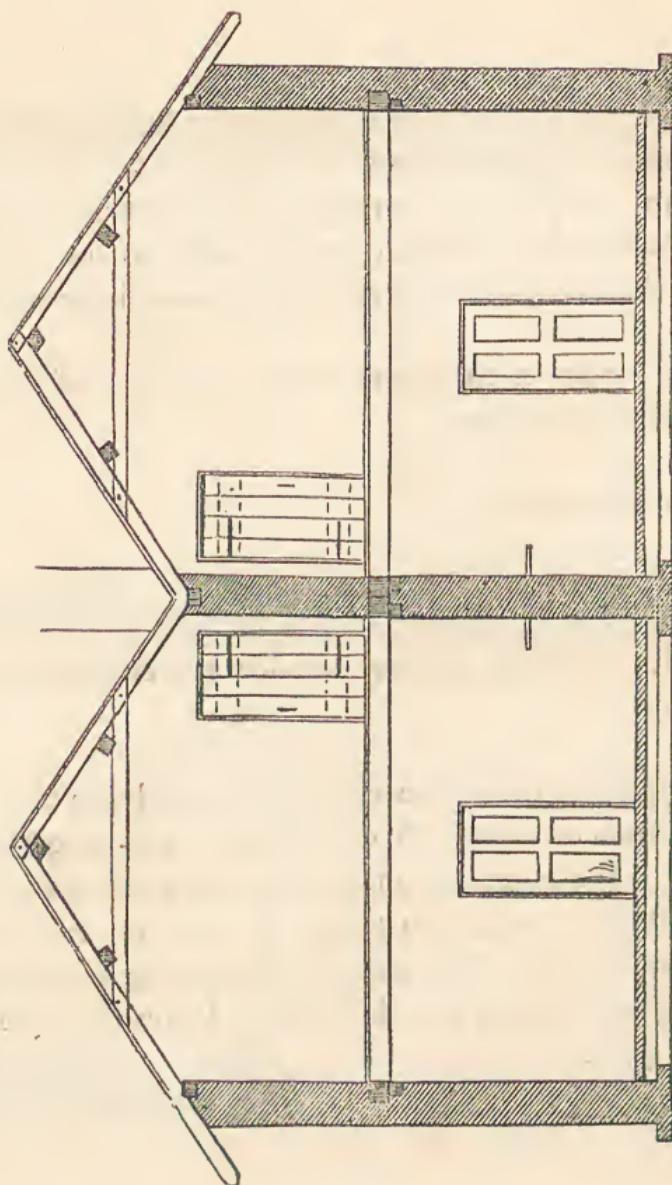


Plate XVII.

Plate XVIII. A ground plan of two houses forming part of a street, suitable to a country town, or village, or the outskirts of a large town. Each house contains on the ground floor, a kitchen or wash-house, in which are the stairs to the upper floor, (under them boxes for fuel and dust,) and a living-room.

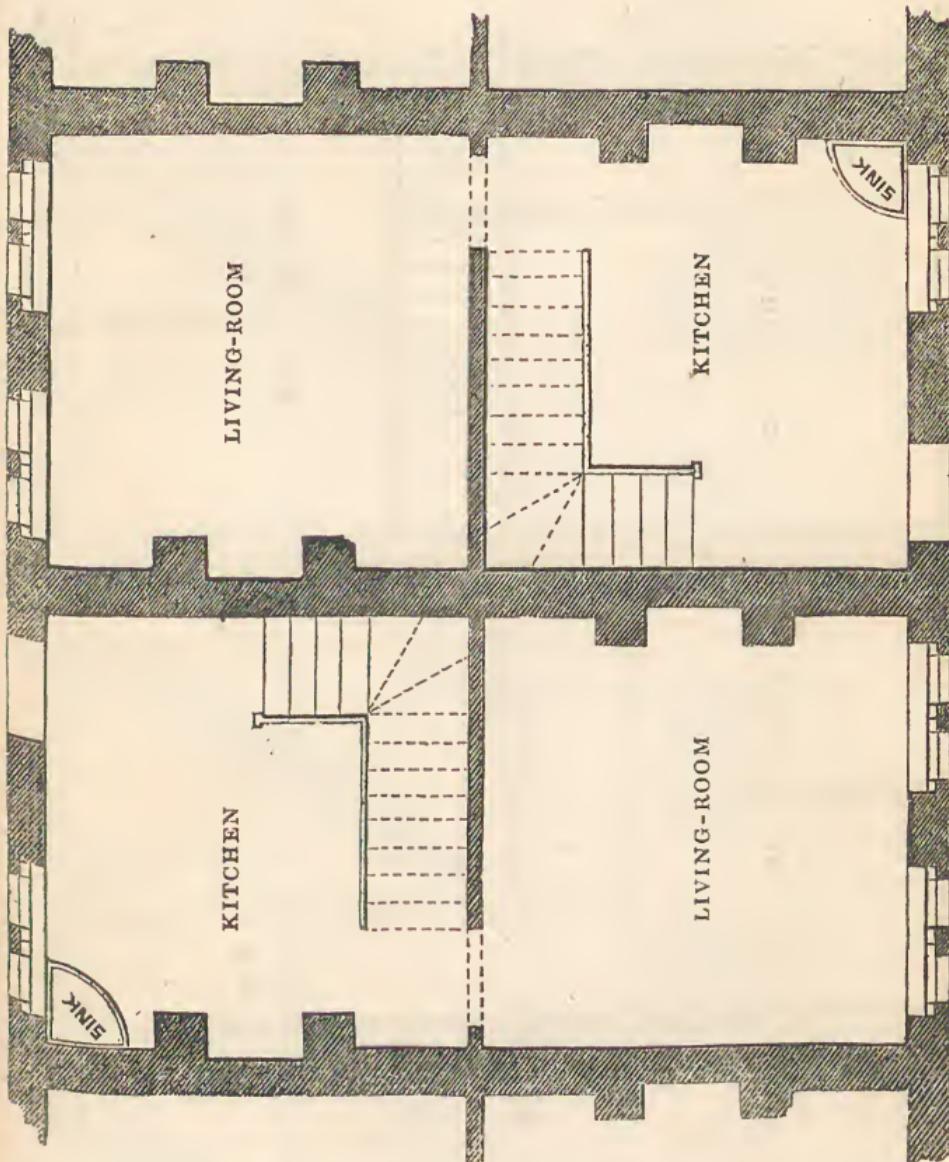
Plate XIX. Plan of the upper story, consisting of three bed-rooms and a water-closet.

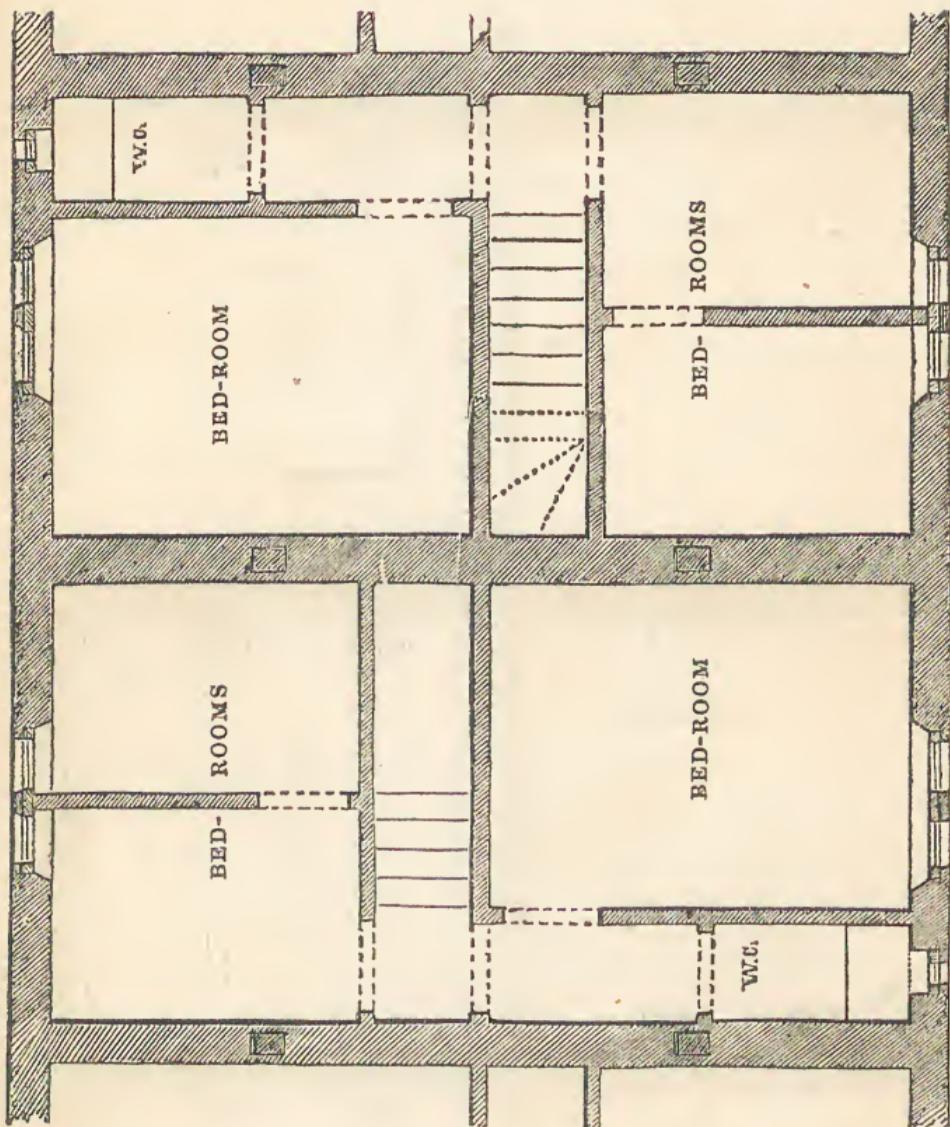
Plate XX. Elevation.

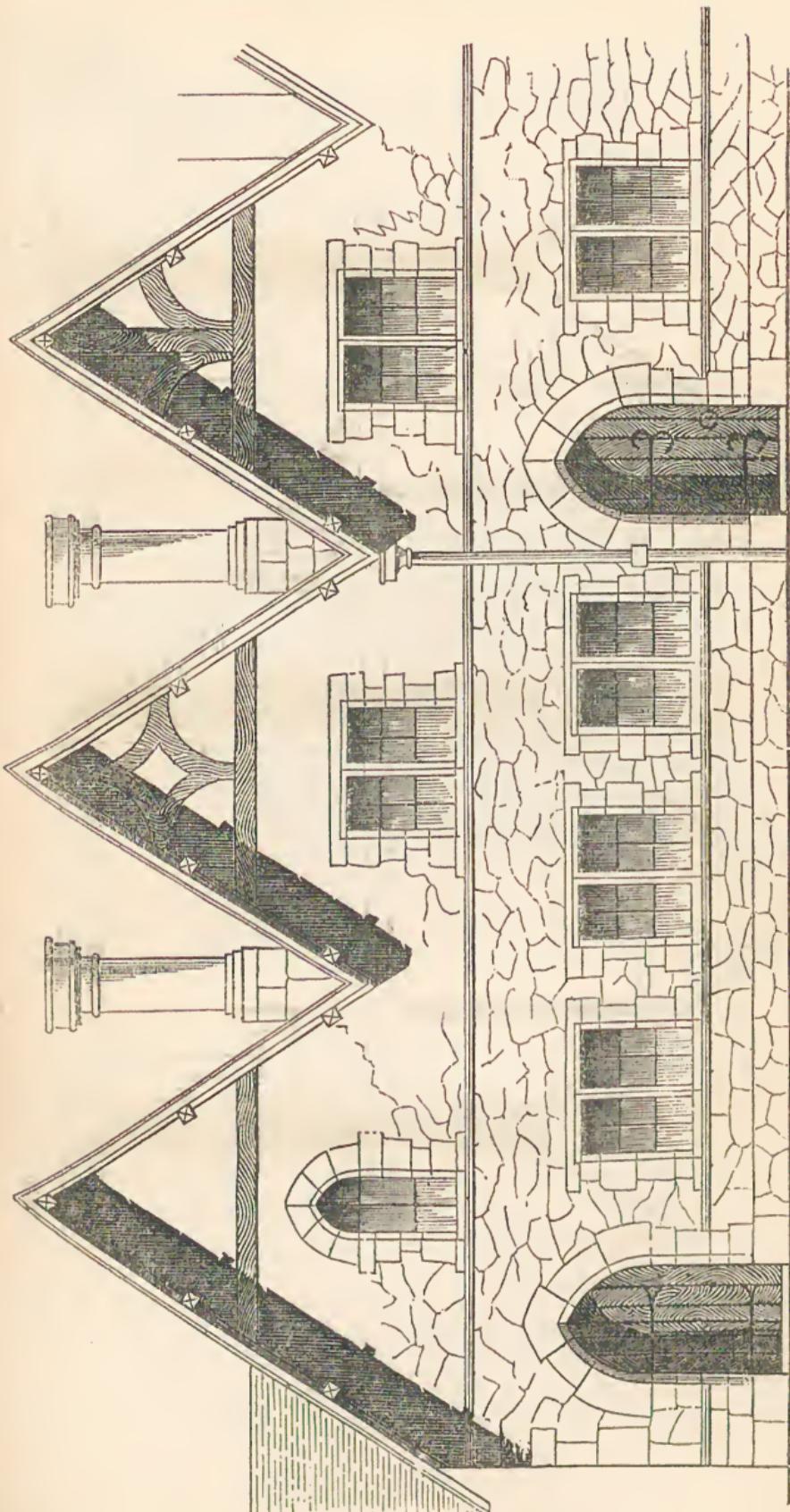
Plate XXI. Longitudinal Section.

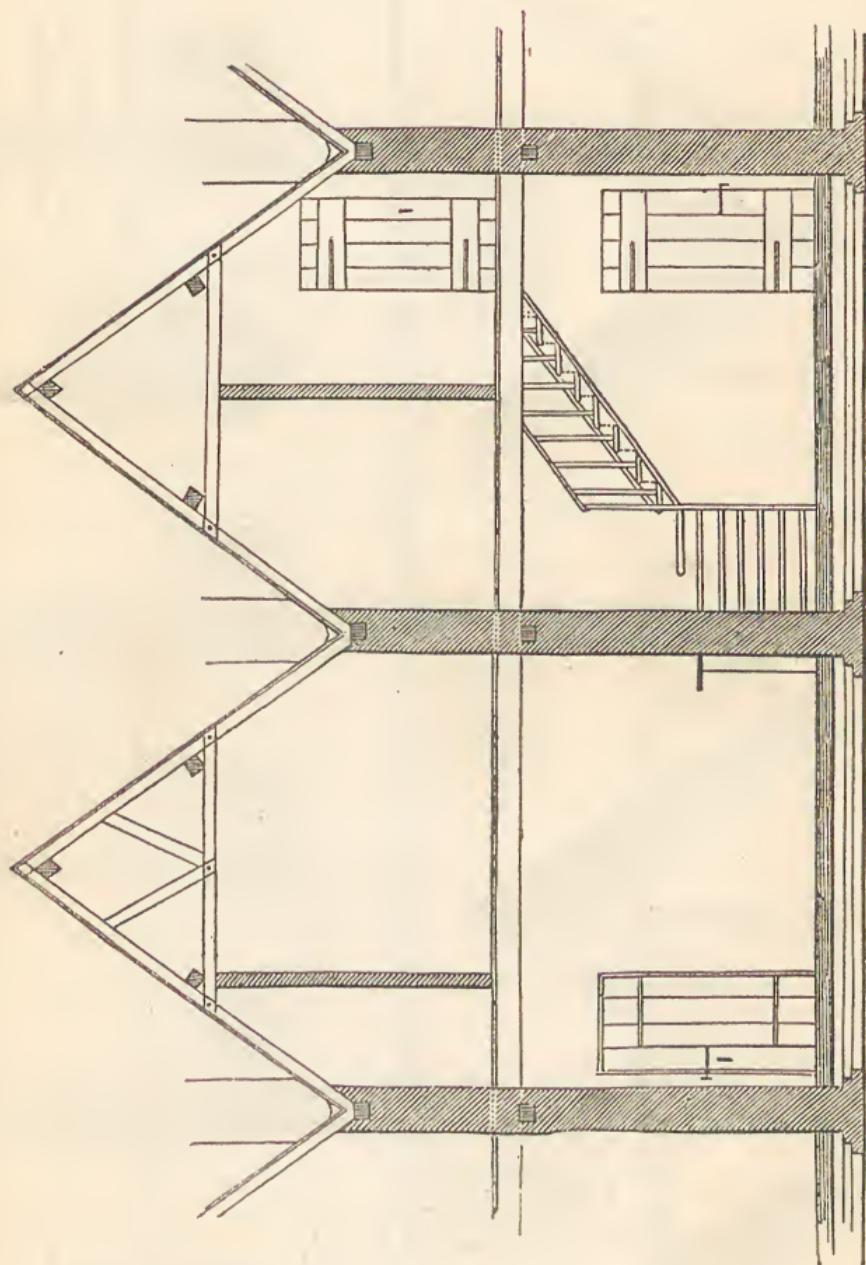
Plate XXII. Entrance doorway, window and chimney-pot, to a larger scale.

The idea of placing the entrance doors alternately, so that a street or court runs on either side of the houses, was suggested by Mr. Weale. It has the advantage of saving much space in confined localities, is more open to the air, and less crowded than the common plan. The entrance door being placed as shown on the plan, opening into the kitchen, leaves the living-room free and quiet.









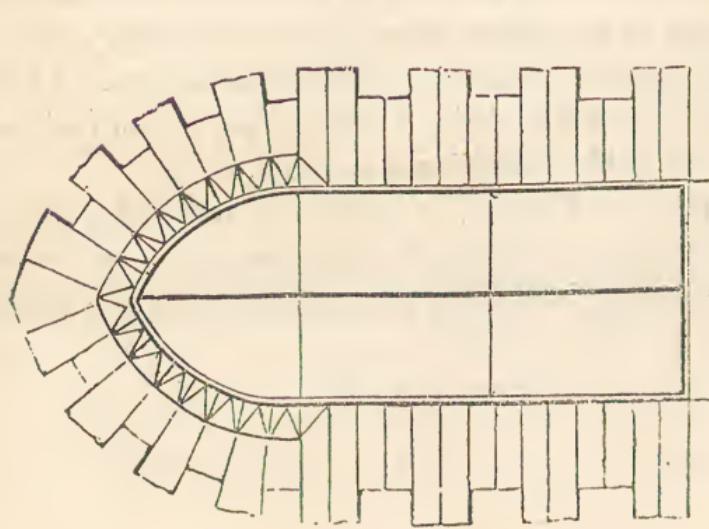
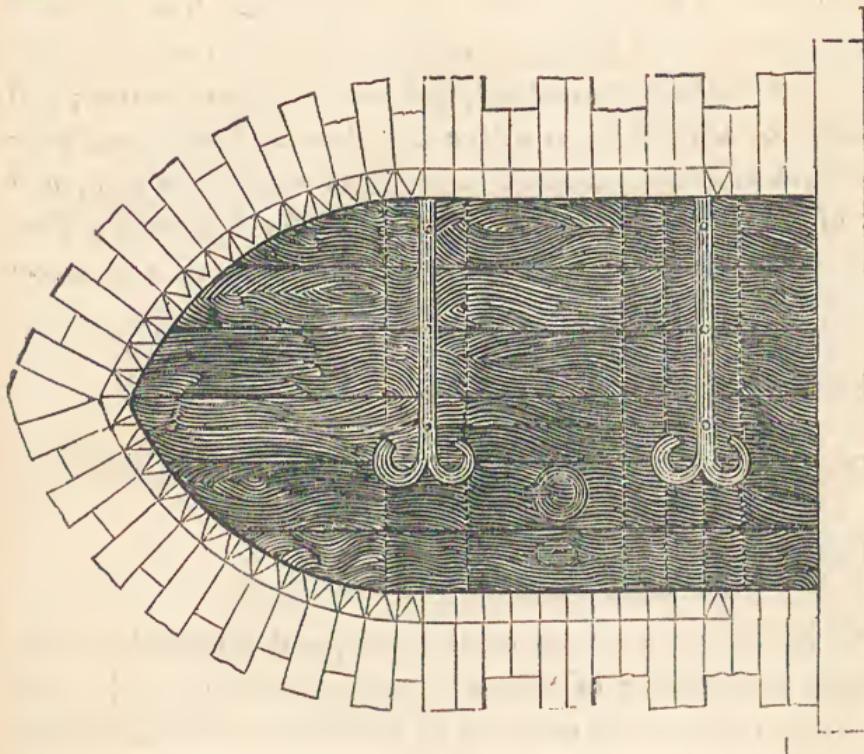
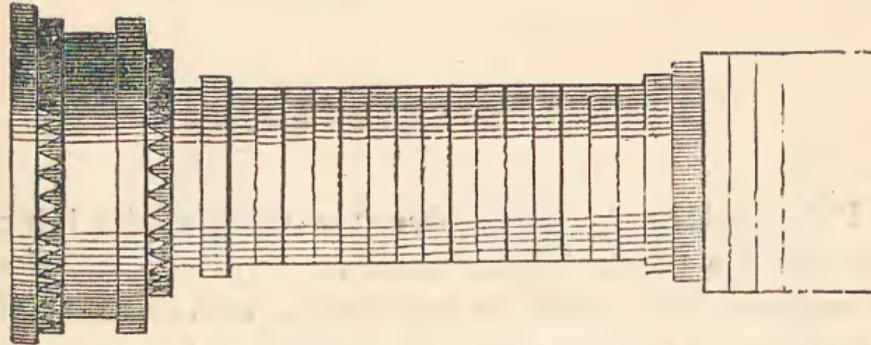


Plate XXII.

Plate XXIII. A ground plan (the upper stories being similar) of a double lodging-house, for towns and localities where ground is valuable, for poor families, each consisting of a man and his wife, with one or two children. The staircase is common to both houses, thereby saving room and expense. Each domicile is quite distinct, and shut off from the rest; and consists of a living-room with a fire-place and two dwarf cupboards, a bed-room, a small passage, in which is a sink, and out of which a water-closet, a large box for fuel, and a dust shaft, from the uppermost story of the house to a common receptacle in the basement.

Plate XXIV. Street Elevation.

Plate XXV. Elevation for a smaller house.

Plate XXVI. Transverse Section.

No back-door is shown on the plan, and a great improvement in the building of streets in towns would be, to lay out the whole of the space enclosed by rows and houses as garden-ground (not as at present, in separate damp plots), and with one or more common entrances between the houses. A trifling sum from each of the inhabitants would pay one of their number for the trouble of keeping it in order.

Many parts of London, at present so unhealthy, from the filth and damp collected in the little yards, &c., at the backs of the houses, might be thus rendered healthy and cheerful.

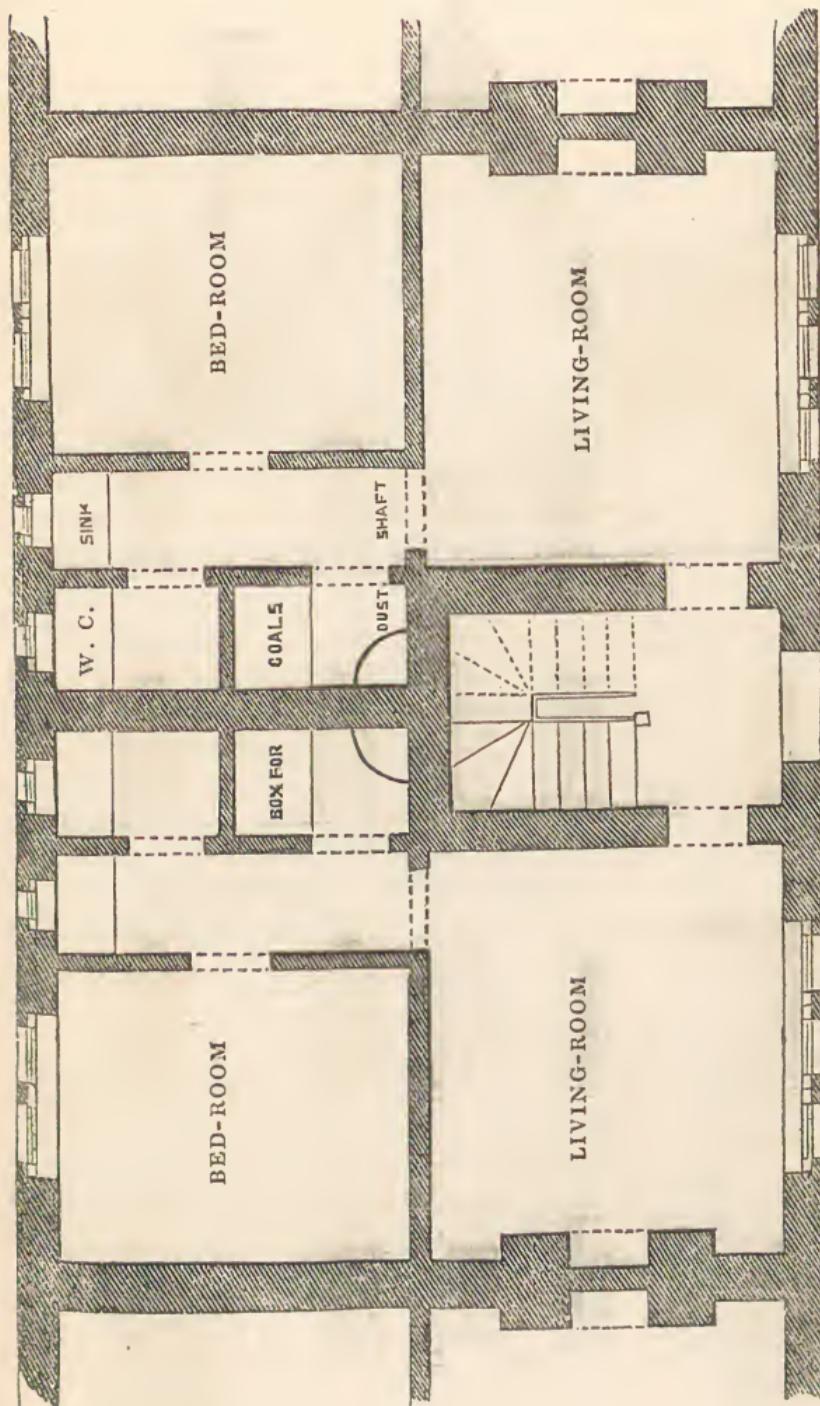


Plate XXXIII.

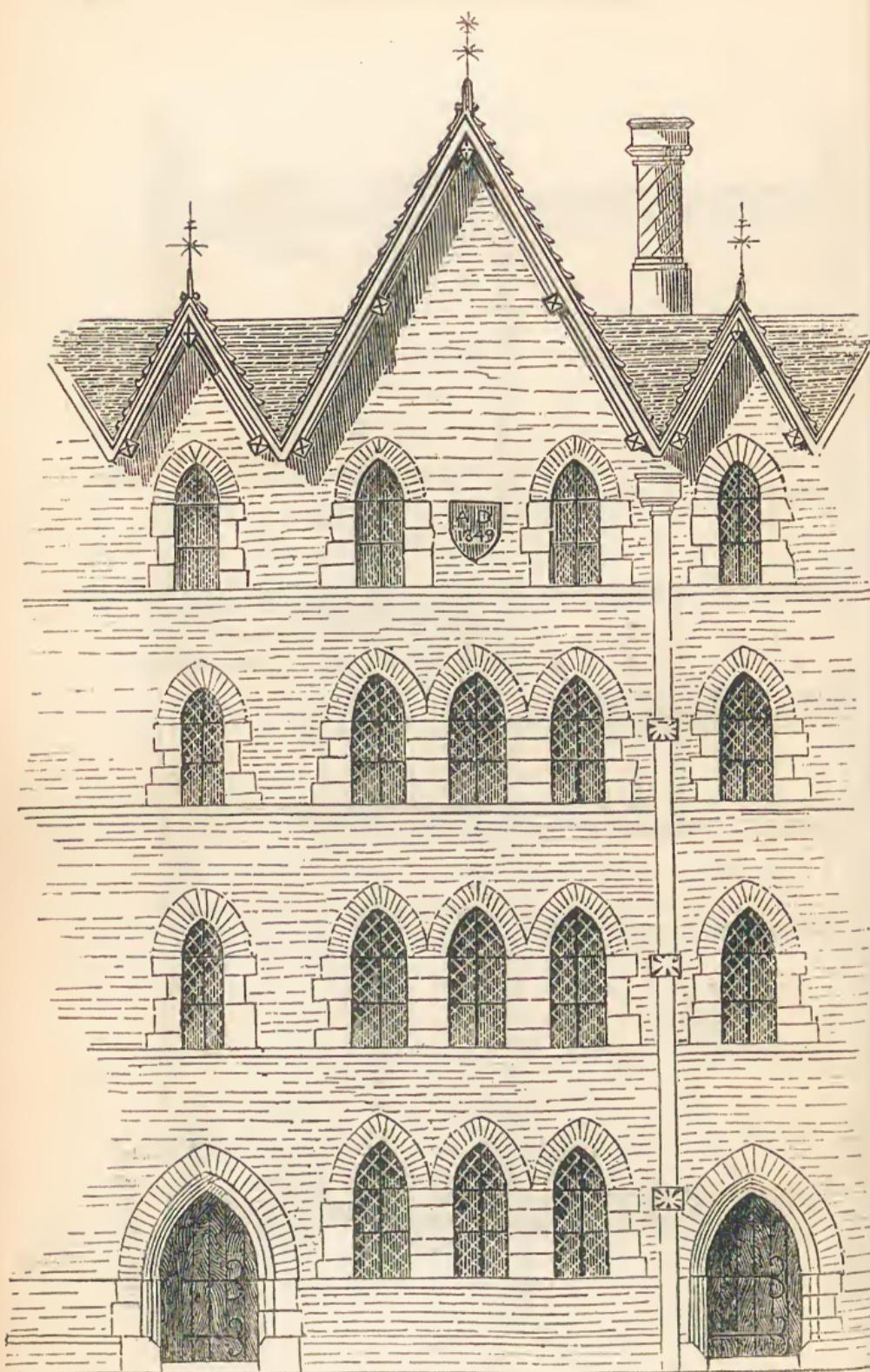


Plate XXIV.

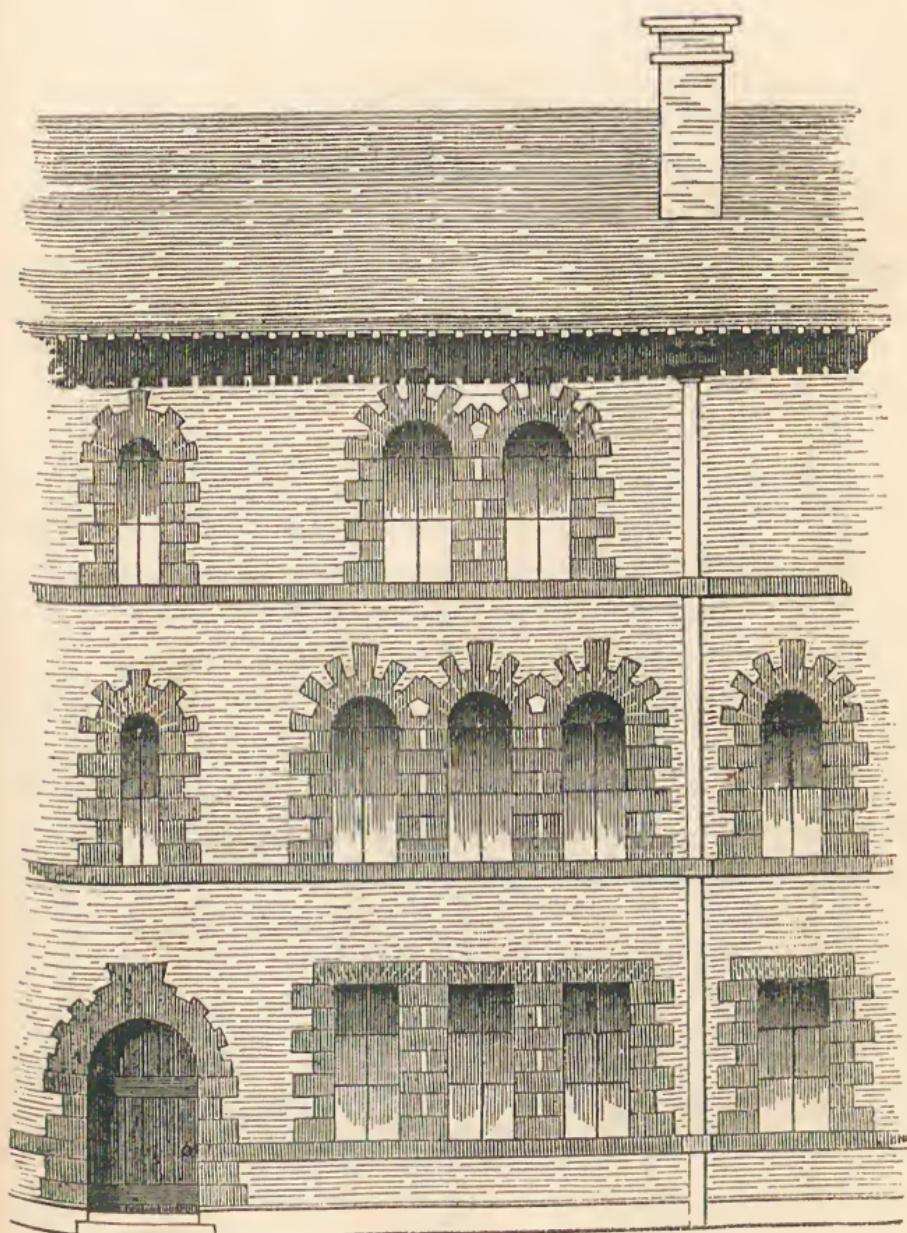


Plate XXV.

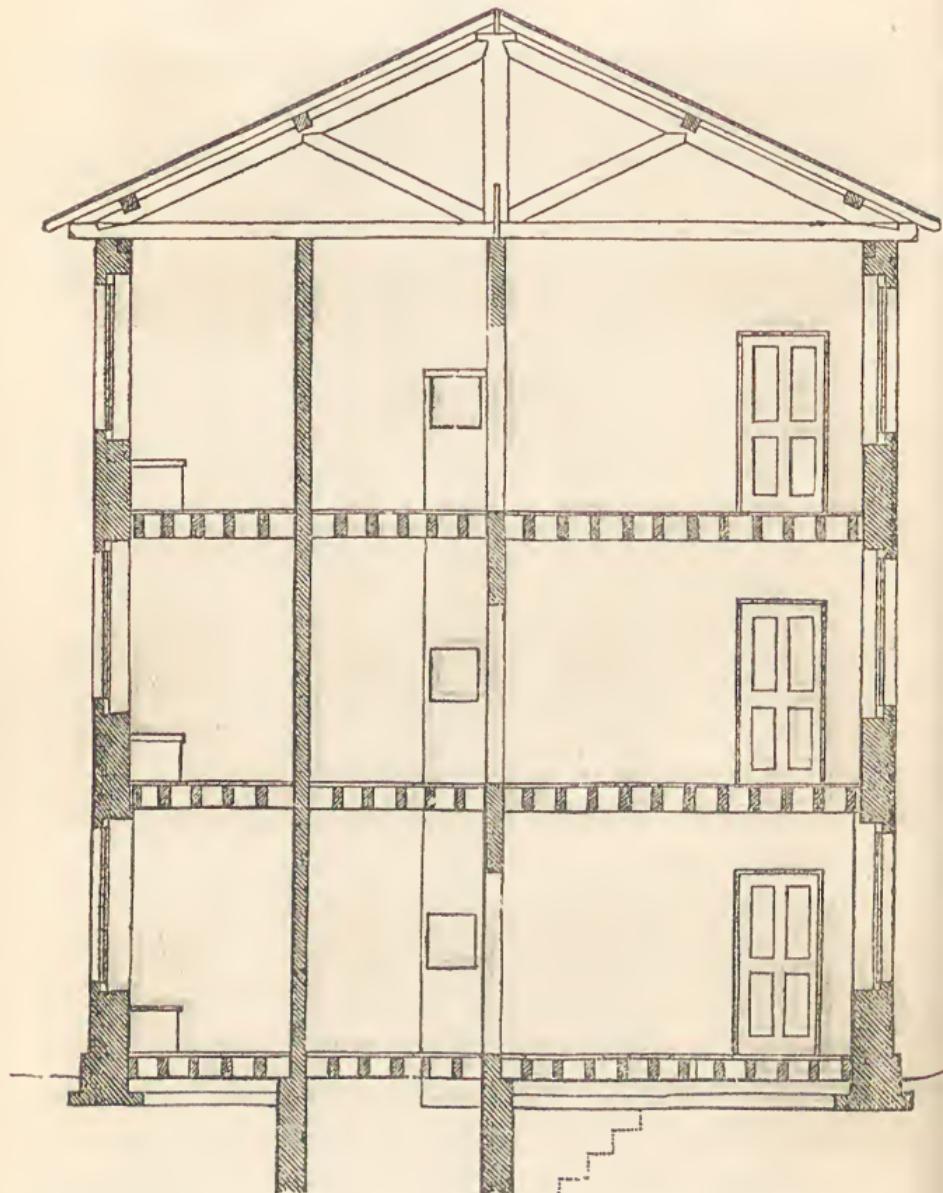


Plate XXVI.

ESTIMATE OF COST.

As the cost of a building varies so greatly in different localities, according to the price of materials and labour, no separate estimate is given; but from a careful one made of the cost of the smallest of these plans (Plates I. II. and III.), an idea may be formed of the expense of structures of this class. It might be built of brick or stone for between £50 and £60. If the walls were of Pisè, the floor of plaster, and the timbers rough, and especially in localities where workmen are to be found used to this kind of work, it might be built for £30; probably for less.

A good plan to lessen the cost of building a cottage would be to make the future occupier himself assist in its erection. In country localities this might always be done, as agricultural labourers in their leisure hours are in the habit of turning their hands to all kinds of work.

And when cottages are built on an extensive scale (as in cases where a nobleman or landlord determines to build a village), the cost of labour might be altogether saved by making the future tenants, all of them, assist in building the cottages, under the superintendence of an experienced workman; and where the building materials are found on the estate, hardly any outlay of *money* would be incurred.

Mr. Loudon says, on the cost of dwellings for the poor,— “No landed proprietor ought to charge more for the land on which cottages are built than he would receive from it if let as part of a farm; and no more rent ought to be charged for the cost of building a cottage, and enclosing the garden, than the same sum would yield if invested in land; or at all events, not more than can be obtained by Government securities. These conditions,” he continues, “are advanced on the supposition that the builder is actuated as much by feelings of human sympathy as by a desire to make money, and hence they are addressed to the wealthy, and especially to the proprietors of land and extensive manufactories or mines.”

THE following Specification is intended to apply generally to buildings of this class, and will serve to show more particularly the nature of the materials and workmanship employed. But as it would be impossible to form a Specification which should be adapted to every case, a mere outline is here given, and it must be considered as rather the framework upon which a Specification is to be constructed, suited to each case, than as a model of an instrument of this kind.

SPECIFICATION

OF

WORKS TO BE DONE IN THE ERECTION OF COTTAGES.

Excavator — The ground is to be excavated for the construction of the foundations, drains, cesspools, and all the other works for which the ground may require to be excavated; and to fill in again, and level, the ground about the foundation and other works.

To remove and cart away all the earth and rubbish, and to leave the house and ground perfectly clear at the conclusion of the works.

Bricklayer — The walls are to be executed with sound, hard, and well-burnt . . . bricks, laid in mortar. The mortar to be compounded of one-third, by measure, of well-burnt stone lime, and two-thirds of clean sharp sand, free from salt, both to be well beaten and worked up together.

To lay the whole of the brickwork in English bond; the exterior to be worked fair and finished with a neat flat-ruled joint; the interior to be worked fair for colouring, or left rough for plastering. It is to be well bedded and flushed

Bricklayer— in with mortar, and no four courses to exceed . . . inches in height.

To construct for soil-drainage, a barrel drain, . . . inches bore; from . . . to . . . in . . . inch brickwork, stuccoed on the lower-half of inside with cement,—or, the drain to be constructed of glazed earthenware pipes, jointed in cement.

To construct a cesspool . . . feet in diameter and . . . feet deep, to be steined round with . . . inch brickwork, and covered with a Yorkshire stone cover.

To construct the rain-water drains from . . . to . . . of . . . inch glazed earthenware pipe, jointed in cement.

To construct a rain-water tank . . . feet diameter and . . . feet deep, of . . . inch brickwork in cement, to be covered with a Yorkshire stone cover.

To put a course of slates between two beds of cement throughout the walls at the level of the ground surface, to prevent the rising of the damp.

To put to all openings in the brickwork plain arches closely set, to be finished externally with a neat flat-ruled joint.

To build up, core, and parget the chimney-flues.

To put to each fire-place a . . . inch brick trimmer, and a chimney-bar of wrought iron.

To thoroughly bed in mortar all the wall-plates, wood-bricks, lintels, bond-timber, and other work requiring to be set in brickwork, and to bed in and point round with lime and hair mortar all the door and window frames.

To properly set with fire-bricks the grates and copper.

To construct an oven with rounded bricks, domed over and cased inside with fire-bricks; and to fix an iron-plate door, and carry up a proper flue.

To pave the . . . with hard, sound, well-burnt . . . bricks laid on edge in mortar, upon dry rubbish.

Bricklayer — To pave the . . . with . . . inch paving-tiles laid anglewise in mortar, upon dry rubbish.

Mason — To put to the external doorways Yorkshire stone solid tooled steps, with mortise-holes for receiving the ends of the door-posts; and to provide and fix a wrought-iron shoe-scraper.

To put to all the windows . . . stone sills, properly sunk and weathered.

To put to each fire-place a hearth and back-hearth of . . . inch Yorkshire stone, and a stone curb round the hearth, as a fender, . . . inches high \times . . . inches thick, chamfered on the outer side.

To put to the fire-places of the living-room and kitchen a . . . shelf . . . inches wide, . . . feet in length.

To provide and fix in the kitchen a Yorkshire stone sink . . . inches thick, with a hole cut to receive the waste-pipe.

To cut in the stonework all necessary holes, mortises, rebates, and grooves, as required.

Slater — To cover the roof with good stout . . . slate, securely fixed with zinc nails, two to each slate. Every part of the slating is to be properly bonded, the eaves to be laid double, and the ridge covered with black ridge-tiles.

The under side of the slates is to be pointed with lime and hair mortar.

To fillet the slating, wherever requisite, against the brickwork, with cement, strong iron nails being driven in to secure it.

Or, To cover the roof with good plain tiles, laid to a proper gauge in lime and hair mortar; each tile to be secured by an oak peg. The ridge to be covered with proper ridge-tiles, secured by T-nails.

Carpenter — All the oak timber to be . . .; all the other timber to be . . ., or . . ., and the deals to be . . . The timber and deals are to be entirely free from sap, shakes, large loose and dead knots, and every other defect.

Carpenter — All the timbers are to measure the full scantlings shown on the drawings ; no joists, ceiling-joists, quarters or rafters, are to be more than . . . inches apart.

To put wood-bricks, where necessary, for fixing the joiners' work.

To put lintels where requisite.

To construct the ground floor joists of . . . inches × . . . inches, on plates . . . inches × . . . inches.

The joists of upper floor to be . . . inches × . . . inches, on wall-plates . . . inches × . . . inches. Trimmer and trimming-joists to be $\frac{1}{2}$ inch thicker.

To frame quarter-partitions of . . . heads and sills . . . inches × . . . inches; door-posts, side-posts, plates above doors, and braces, . . . inches × . . . inches; quarters . . . inches × . . . inches.

To construct the roof of timbers and wood-work of the following scantlings and sizes :

Wall-plates . . . inches × . . . inches; purlins . . . inches × . . . inches; collar-beam . . . inches × . . . inches; rafters . . . inches × . . . inches; ceiling-joists . . . inches × . . . inches; ridge-piece . . . inches × . . . inches; slate battens . . . inches × . . . inch.

Roof over lean-to :

Wall-plates . . . inches × . . . inches; rafters . . . inches × . . . inches; slate battens . . . 2 inches × . . . inch.

Joiner — To construct the floors of . . . of . . . inch . . . deal; wrought and laid folding,— or, straight joint.

To fix a . . . inch deal skirting . . . inches high, in

To construct the stairs (if the cottage have an upper floor) of . . . inch deal treads, with splayed nosings, framed into . . . inch string-bearers, with newel, and balusters, one on each step, and splayed hand-rail.

To put to the external doorway proper fir

Joiner —— door-cases . . . inches x . . . inches, with the door-posts tenoned into the door-step.

To put to the front doorway a . . . inch deal square and bead-but six-panel door, to be hung with strong wrought-iron hinges, one . . . inch barrel bolt, and a good . . . inch iron-rimmed lock.

Or, To put to the front doorway a . . . inch deal door, formed with vertical ledges, rebated and beaded joints nailed to back braces . . . inches x . . . inch, to be hung with strong wrought-iron hinges, one . . . inch barrel bolt, and a good . . . inch iron-rimmed lock.

The back door to have in addition a Norfolk thumb-latch.

The doors of out-buildings to be of . . . inch deal.

To fit up all the internal doorways with four-panel . . . inch square-framed doors, with . . . inch deal panels, hung with wrought-iron hinges, good . . . inch iron-rimmed locks, and stout Norfolk thumb-latches; . . . inch single rebated linings: or, hung to . . . inch jambs and heads, having a bead on both sides to cover the plaster joints.

To fit to the window-openings deal-cased frames with oak sunk sills; to have . . . inch sashes double hung, with iron weights, iron axle-pulleys, lines, and fastenings.

Or, To fit to the window-openings solid fir, wrought, rebated, and beaded frames, with oak sunk sills, which are to have . . . inch deal casements filled in with cross bars, hung with but-hinges, and provided with proper fastenings.

To fix to the inside of window-openings . . . inch deal window-boards, jambs, and soffits.

To put in the recesses of the fire-places in . . . dwarf closets, with . . . inch tops, on proper bearers, . . . inch deal fronts, and . . . inch deal square-framed door, hung with . . . inch but-hinges, and to have . . . inch good closet locks; and to put to each of the closets a shelf of . . . inch deal.

Joiner — To fix in the kitchen a dresser . . . feet long . . . feet wide, of . . . inch clean deal, with two drawers of . . . inch deal fronts and . . . inch deal dovetailed rims and bottoms, strong legs and bearers, . . . inch deal foot-board, and above,—three . . . inch deal shelves.

The privy to have a seat of . . . inch deal, with deal riser and cover.

Plasterer — To lath, plaster, set, and whiten the ceilings and partitions in . . .

To render and set the walls of . . . ; the same to be coloured twice with a good stone colour,—or, prepared for paper.

The privies are to be lime-whited inside.

Smith — To provide and fix a . . . inch cast-iron guttering to the eaves throughout, to be securely fixed to wrought-iron brackets.

To fix cast-iron rain-water pipes . . . inches square, with heads, and shoes delivering into drains.

To provide and fix in the kitchen fire-place a grate, having a . . . inch oven and . . . boiler.

The other fire-places to have . . . grates.

To provide and fix a copper in scullery.

To provide and fix a bar to each window on ground story.

To provide and fix cast-iron air-gratings in the external walls, where directed.

To provide and fix casements of wrought iron.

To provide all other requisite iron-work.

Lumber — To lay the valleys of roofs with milled lead . . . lbs. to the foot,—or,

To provide and fix a pipe to conduct water into the cistern from the town or other supply, and a pipe from the cistern to sink, with brass cock.

Or, To provide and fix an iron pump, with pipe to rain-water tank.

To put from the sink to the drain a strong lead waste-pipe, with a large bell-trap.

Painter— To properly prepare and paint the whole of the wood and iron work four times with good and proper oil colour.

Or, To stain and twice varnish all the wood-work.

Glazier— To glaze the windows with good second Newcastle glass, properly bedded, and back-puttied.

Paper-hanger— To prepare properly and hang the whole of the plastered sides of the . . . rooms with paper at . . . per yard.

Yards, gardens, Properly form and level the surface of the and yards or gardens.

External walls. The enclosure-walls of gardens to be . . . inches thick and . . . feet high, and to be formed of . . .

The whole of the works are to be executed and finished in a good and workmanlike manner, according to this Specification, and with the materials and workmanship described therein, and according to the drawings of plans, sections, elevations, and details, all of which are to be strictly attended to, as to form, dimensions, and all other particulars therein shown.

No extra works are to be charged for but such as are agreed upon at the time, and an order in writing given to the contractor.

A P P E N D I X.

MESSRS. GARDNER AND SON'S

PLAN FOR A LABOURER'S COTTAGE,

Brick or stone built, and slated; fitted with stoves, copper, and sink; the shutters of the windows to form table, dresser, or ironing-boards; erected and completed for £ 84; land allotted, 20 poles.

CUBIC CONTENTS.

Wash-house	.	.	.	.	.	336	cubic feet.
Boys' bed-room	.	.	.	.	.	336	"
Living-room	.	.	.	.	.	1056	"
Parents and Infant bed-room	.	.	.	.	.	880	"
Female bed-room	.	.	.	.	.	560	"

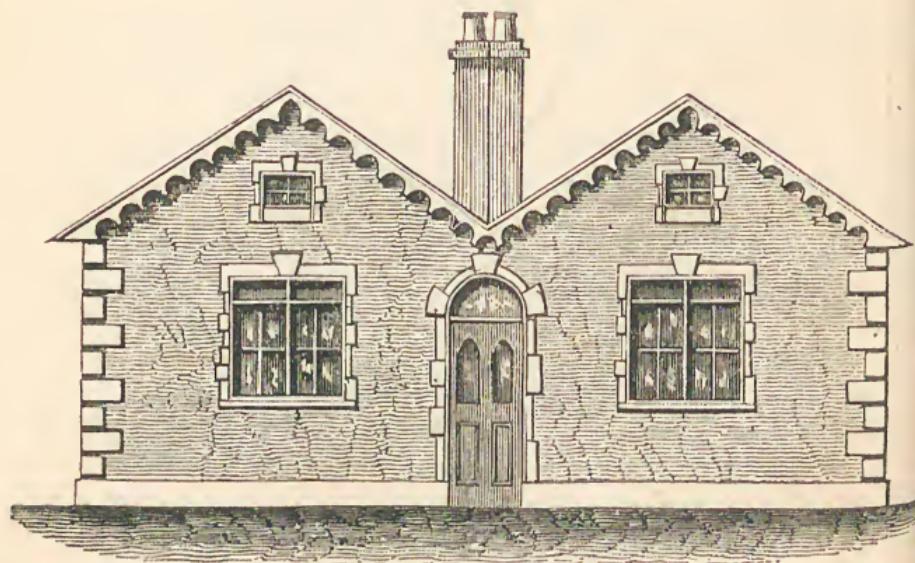


Plate I. Elevation.

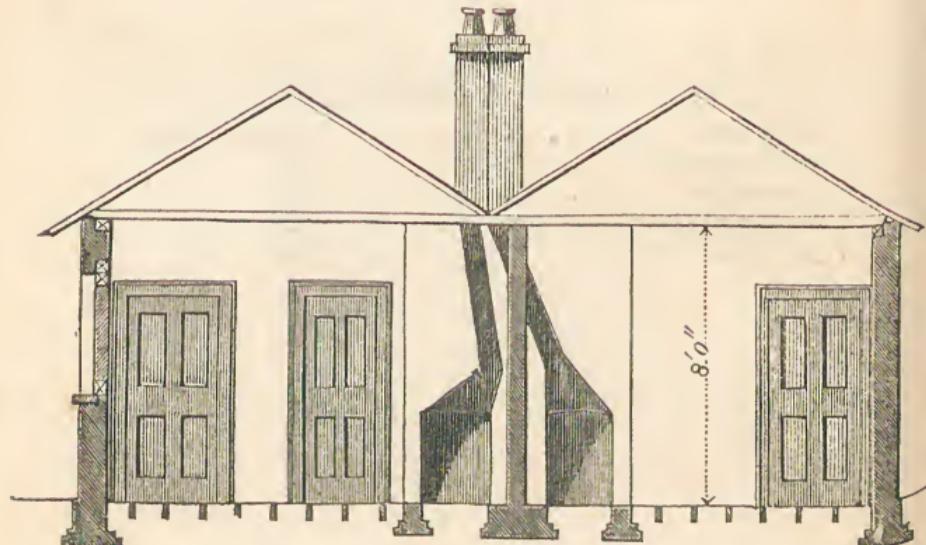
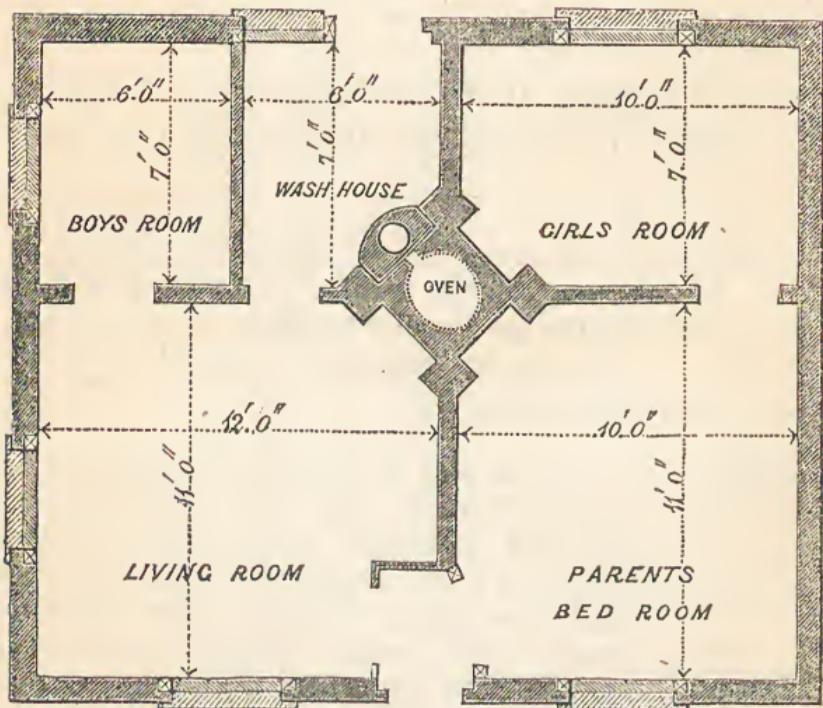


Plate II. Section.



Scale $\frac{1}{6}$ th of an inch to a foot.

Plate III. Ground Plan.

GARDNER AND SON,

Surveyors, &c.

5, Commercial Road, Peckham.

SPECIFICATION

OF

WORKS TO BE DONE IN THE ERECTION OF ONE LABOURER'S
COTTAGE OF FIVE ROOMS.—(SEE PLATES I. II. III.)

Excavator— Excavate the whole of the ground to be covered by the building to the depth of 6 inches at the least; dig trenches for drain-pipes as directed; and form cesspool, not less than 6 feet deep.

Bricklayer— Provide and lay with cement joints 40 feet of 4-inch red drain-pipes; carry up the walls and the brick partitions with proper footings, as shown in plan; provide and work in six iron air-bricks where directed,—the bricks to be sound stocks, malm pickings, or other hard smooth-faced bricks, laid in grey stone-lime and sharp sand mortar; the outside of the brickwork to have a neat plain joint, and the inside of walls and both sides of partitions to be worked fair, flush, face-pointed and rubbed to receive colour; stein the cesspool; work in all the doors and sash-frames, and make good to them; bed all sills and frames; core the flues, and fix compo or other chimney-pots thereon; erect oven in middle of flues, as shown in plan; set the copper and stoves; fix sink; pave the living-room and wash-house with sound hard bricks laid on lime core, black ash, and sand concrete; herring-bone courses; project brick corbels to receive stone mantel-shelves, and finish the brick opening for chimneys very neatly, and do all brickwork required to finish the building as per drawing.

Carpenter— Prepare solid door, and mullion window-frames for sashes or casement-lights, as may be directed, ready to be worked into the brickwork and properly secured; the door-frames to have York quarry-faced sills mortised for posts, and the inner frames to form part and parcel of the brick-nog partitions, the entireties of which are to be mortised and pinned into the door-frame, and the head to run all through; put bond timber and wood-bricks where required; lay ground-floor joists with sleepers upon dry bricks, all $4'' \times 2\frac{1}{2}''$ —the partition the same, framed to doorways, but no bottom plate, except the stone sills of doors; the ceiling-joists to run through $4'' \times 1\frac{1}{2}''$, plates $4'' \times 2\frac{1}{2}$, rafters $4'' \times 1\frac{3}{4}$; the heads of partitions to be properly secured thereto, and strutted to the same and ceiling-joists; the ridge-boards $7'' \times 1''$; lay inch eaves and gutter-boards, $\frac{3}{4}''$ slating battens; erect privy of light quarters and feather-edge boards, inch elm seat and riser, and floor with $\frac{3}{4}$ ledge; door hung and fastenings; lay the floors with 2-cut spruce battens, prepared and laid folding; prepare and hang four-panel or inch ledge doors to all the doorways; provide and put on proper fastenings; fit and hang sashes or casements to all the windows, and provide proper fastenings; fit flush ledge shutters to the windows, hung to sill, to form dressers or tables if required; fix $1\frac{1}{2}''$ cut verge to gables, cut out of $1\frac{1}{2}''$ plank, one from the other; put all stops and linings, and complete all carpenter's and joiner's work required: the timber to be sound Baltic red pine, or other approved material.

Slater— Slate the whole of the roof with Countess slates, properly nailed with metal nails, and put slate fillet ridges laid in putty.

Plasterer— Lath, lay, and set all the ceilings, and whiten, stop, and colour all the walls and partitions.

Plumber— Lay 4-lb. lead gutters to roof and chimneys;

Plumber —— put lead fillets to bottom of all window-sills, 4 inches wide, to project 2 inches from wall; put zinc gutter to eaves and cistern-heads, and pipes to convey water to butt; glaze all the sashes or casements; stain all the woodwork with Stephens's oak-wood stain or other approved dye; and do all plumber's, painter's, and glazier's work required.

Smith —— Provide and fix one galvanized iron 18-inch copper and ironwork, one 24-inch or small range, two small elliptic stoves, three stock locks, eight rod-bolts, twelve pairs 14-inch X garnetts and screws, iron legs for shutters, seven Norfolk latches, four chimney-bars, &c.

Mason —— Provide and fix one 18-inch stone sink, trap, and pipe, six quarry-faced York sills, one 5-hole sink stone, three York rubbed mantels for chimney, to be fixed on corbels, and 12 feet 2-inch quarry-faced York for front and back doors.

ECONOMY OF RURAL DWELLINGS

FOR

TRADESMEN AND PERSONS OF LIMITED INCOMES.

BY JOHN WEALE.

IN the following pages an attempt has been made to introduce a new feature in Rural Design, principally for classes which have been overlooked by the numerous benevolent projectors of Residences and Cottages especially designed for the lodgement of the labouring population. In the present volume it is now additionally proposed to turn attention to the numerical progression of the population in large towns, and more especially that of the city and out-parishes of London: it is therefore particularly addressed to persons resident in confined and ill-ventilated districts, consisting either of small tradesmen or of persons of small incomes, the latter of whom, almost wholly from necessity, live in lodgings. The population of London and its vicinity, viewing the subject as a sanitary question, is alarmingly extending: 2,400,000 is the minimum number, comprising rich, mediocre, and poor—the last-named forming the larger proportion, living in low and objectionable situations, exposed to contagion and disease. It is therefore essential, in regard to health, to live in more invigorating districts. Cholera, both epidemic and contagious, is more baneful in its effects on persons sleeping in sickly localities than in more open and healthy places. In many of these unhealthy districts there is a numerous class of tradesmen, who, by letting their upper stories for warehouses, offices, or workshops, could afford by the proceeds of such letting to live outside of the town, if an economical scheme of doing so were placed conspicuously before them. I have attempted to introduce such a design

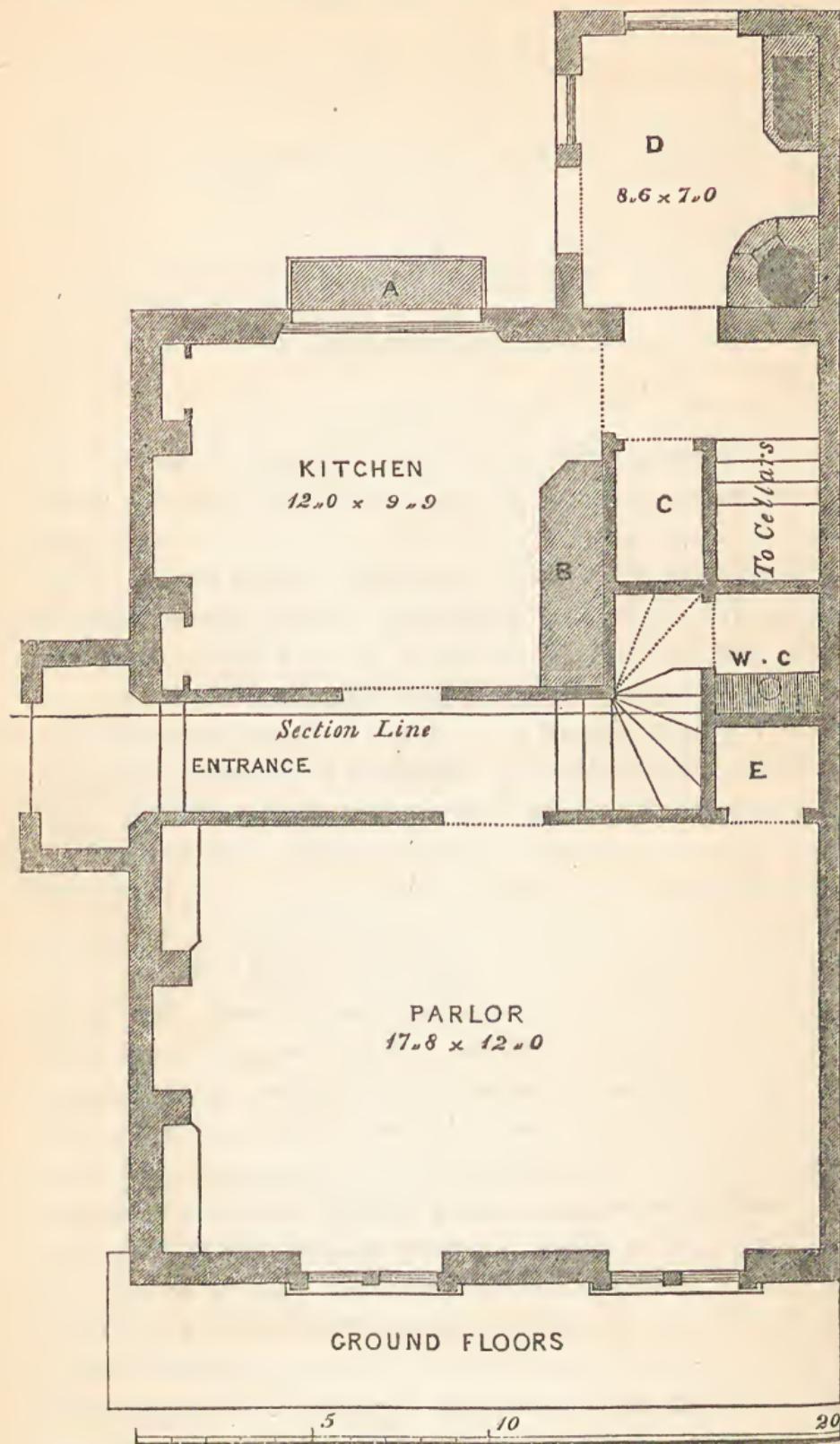


Plate I.

A. Larders outside kitchen windows. B. Dressers. C. Closets with shelves. W. C. Water-closet.

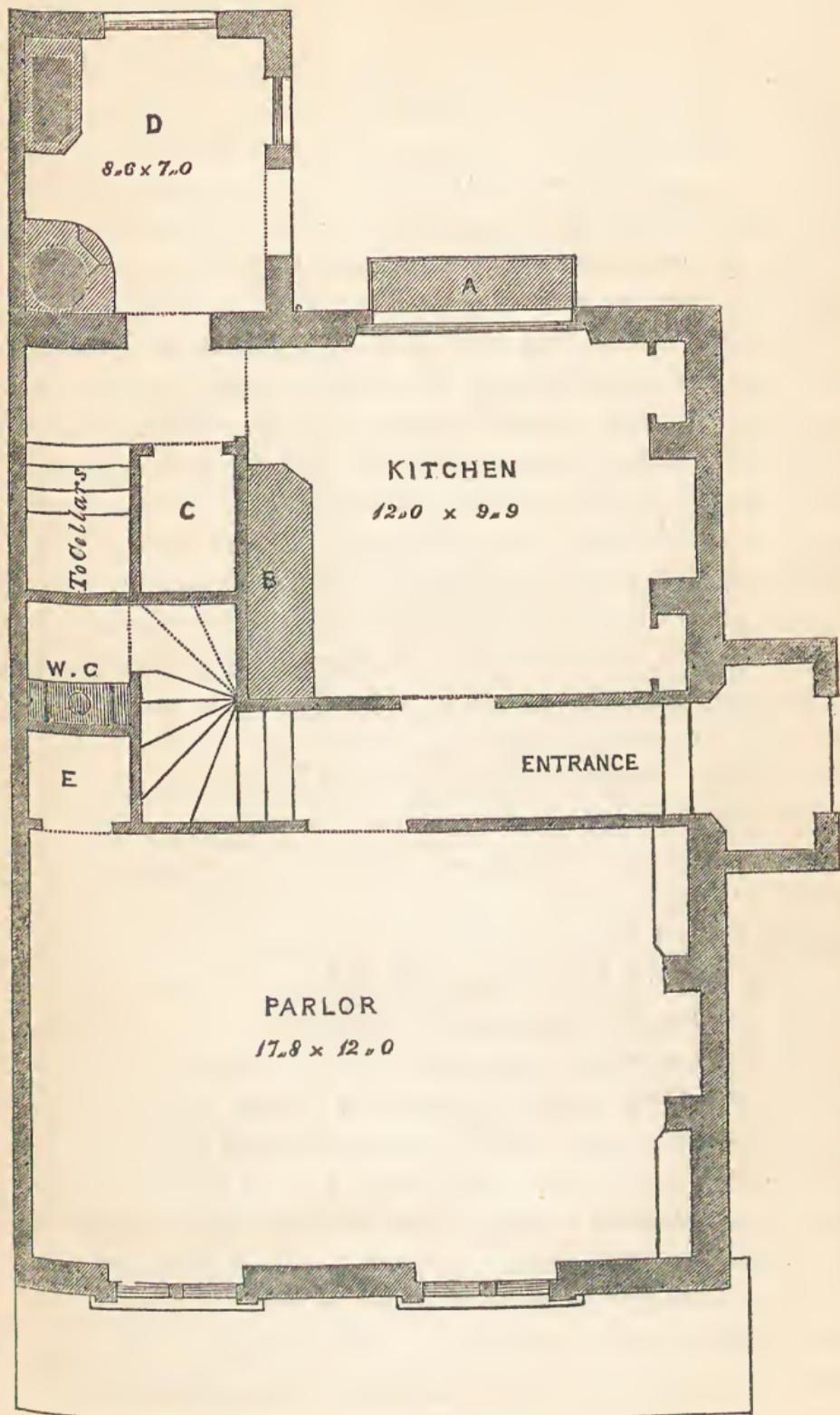


Plate II.

D. Wash-houses, pumps, sinks, and coppers. E. Closets.
w. c. Water-closet.

for the advantage of persons of humble pretensions, and for those also who are living on very limited incomes.

The convenience of omnibuses in the neighbourhood of London and in all our principal towns, now plying at all times, affords the means of easy access, and at a cost which, added to the rent, would probably be less in amount than the rental received by persons who let off their premises for trading purposes, while those who live on their narrow incomes would not incur so great an expenditure in omnibus fares.

In the Cottages that have been designed of an humble kind, an apparent similitude of elevation exists in almost all of them. In the present instance, I have, without losing sight of the nature of our scenery and climate, made such exterior and inexpensive decorations as will, it is presumed, be received as agreeable and picturesque to the taste. The interior is made what is designated in ordinary parlance 'snug,' besides being warm and comfortable, for a married couple and a small family. Consideration has been given to our humid and chilly atmosphere, which, although much complained of, yet, by temperate living and common care, is the best in the world to promote healthy enjoyment and longevity. It is a bad climate (so are all climates) for those who eat and drink to excess, and who, keeping out till late hours, subject themselves to colds, coughs, and bronchial affections; but my objects are for humble tradesmen and for those of humble incomes, who by temperance will probably live longer than those who can afford unnecessary indulgences.

There are some tradesmen who have been fortunate in their affairs, and saved sufficient money to invest in the many schemes afloat,—some few of them lucrative, but a great many not so: how much better is it for such persons to invest their industrious proceeds in land for the building of good, substantial, and convenient houses? Numerous classes are eager for renting houses from £ 20 to £ 25 per annum. I do not know of any of such small rentals in the neighbourhood of London, except for such houses as are run up by unscrupulous persons

with bad material, with no contrivances for drainage and ventilation, and located among people of low habits. Communities might be established of respectable and industrious persons, the mainstay of the country, in the neighbourhoods of large towns, the freshened air giving health to the body, vigour to the mind, and morality to the inner man,—healthy and robust children, and a becoming pride in the cleanliness and comfort of the domestic arrangements of life.

A suggestion may not be inappropriate. Freehold land has been purchased averaging from £80 to £250 an acre; (land has been sold, near London, as high as £1200 per acre, but in expensive localities, upon which large houses have been erected;) but land equally healthy in its nature has been sold at the above lower prices: about an acre of ground would be sufficient for the erection of twelve rural dwellings, or six double cottages, with small garden-ground for the growth of flowers and vegetables. The accompanying designs have been specified with great care, as will be hereafter shown, costing each in construction and finishing for occupation £190, or for each double house £380; and the latter sum multiplied by 6, makes £2280. An average of £150 may be taken for the purchase of the land, making a sum total of £2430. It may be supposed that each of these residences would produce at the lowest an annual rental of £20; the production of the whole being £240, realizing, after allowing something for casualties, 10 per cent. upon the outlay of capital. Many small capitalists could not desire a better or a more secure return for so small an investment, and if purchased by a community of twelve persons, each would be entitled to a vote for the county in which the property is situated, wholly independent of political societies.

In the former part of this volume the necessary provisions are treated of for excavating the ground, for ventilation and sewerage, and the quality of material to be used. These are essential conditions of health: much depends on the nature of the soil on which the building is to be erected and the selection

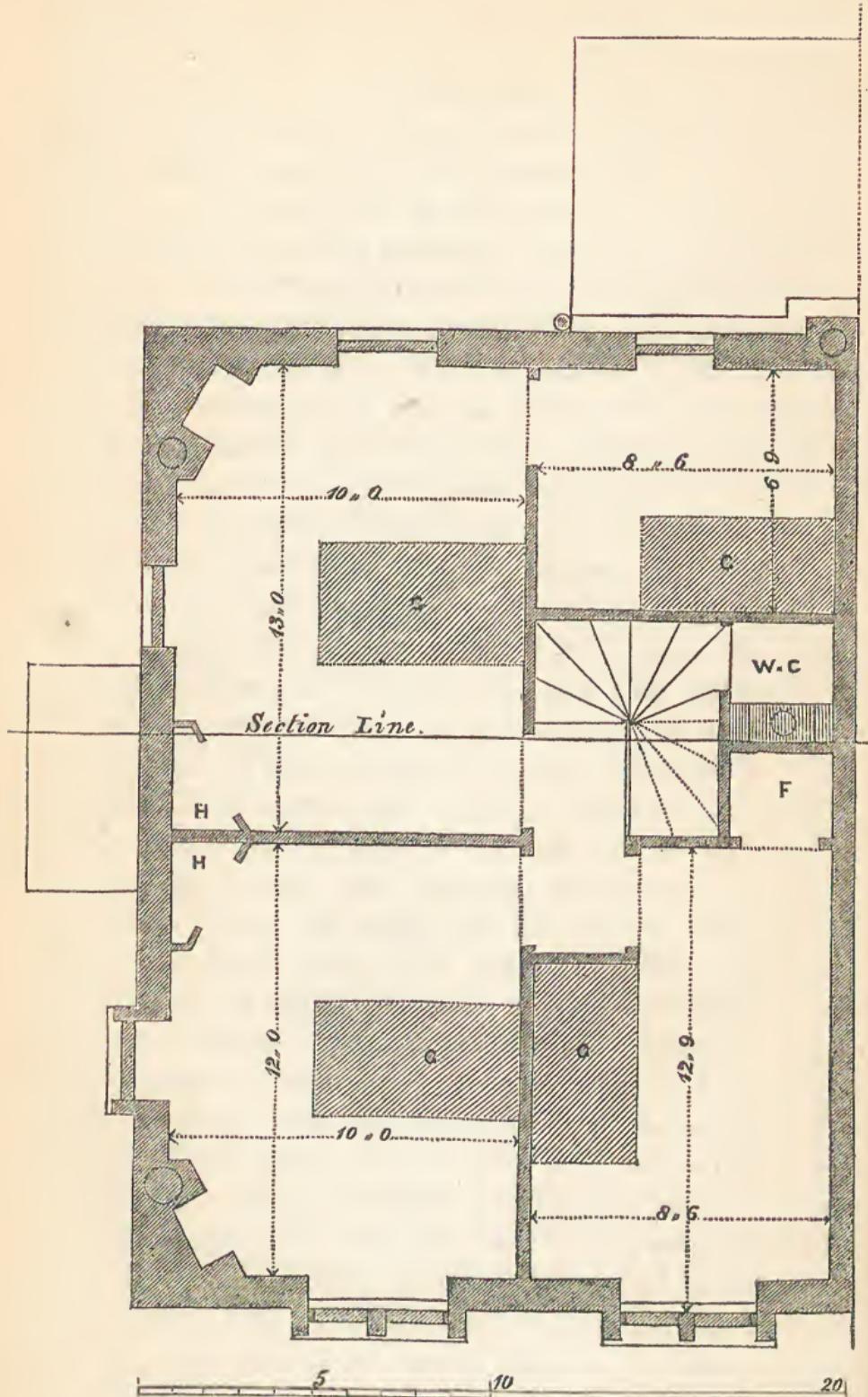


Plate III. Chamber Floor.
 F. Closets under cisterns. G. Bed Rooms. H. Closets.
 w. c. Water-closet.

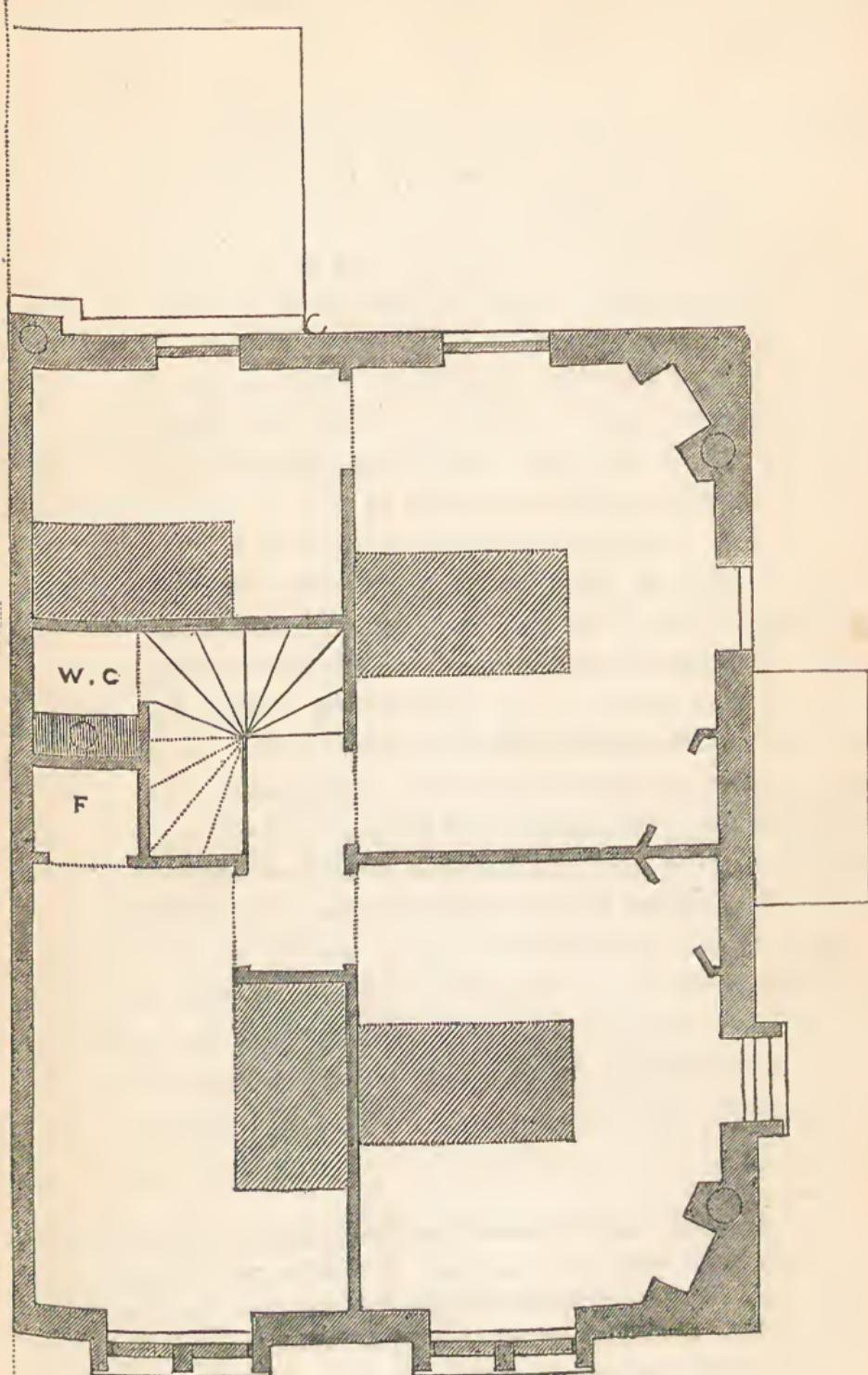


Plate IV. Chamber Floor.
w. c. Water-closet.

of a proper site: * a slope should be preferred for the easy drainage of surface water, waste of the house, and the sewerage, †—and if convenient to a running stream the better. I would recommend that the cesspool should be in communication by an earthen pipe, to carry off the soil and waste water continuously, if the cesspool is placed in the garden or rear of the house. ‡ I have never seen in this country what is of common and of economical practice in Holland: at the proper intervals labourers are employed in dragging or raking the channels of water for the deposit, bringing it on the land, and strewing it over the surface. This is the best kind of manure, so that the land, notwithstanding the unfavourable position of the country, is always in a state of fertilization. At the risk of being pronounced chimerical, I must express my abhorrence of the practice of hoarding up all kinds of dung and refuse, allowing it to lie for a considerable time to pollute the air and breed all kinds of filthy animalculæ, and at the fixed time strewed along the fields to manure and enrich the land with dangerous crawling insects which are found in streams of water and swallowed by the cattle feeding in the fields. The same cattle are slaughtered for human food, and animalculæ exist in the meat, to the detriment of the otherwise healthy body of the subject who swallows the same into the stomach.

In Ireland a considerable trade is carried on by burning the lime-stone to be found extensively in that country, and making the lime serve as a manure, which in damp soils and in low situations is admirable for nourishing and giving vigour to the soil, uncongenial to insects: in England we are

* See p. 21.

† See p. 23.

‡ Mr. Bazelgette, in his Report to the Commissioners of Sewers, dated May, 1853, says: “For house drainage (in Manchester and Leeds) the practice is to unite the cesspool and ash-pit in the same hole, having an overflow drain connected with it through a small iron grating, and to remove the solid contents in carts. The ashes act as a deodorizing medium; and I was surprised to find so little nuisance arising from these receptacles in open courts, where they are uncovered.”

similarly situated in several districts, and we ought to profit by this kind of beneficial Irish experience.* In the absence of the advantage of sloping land, care should be taken to secure the soil and refuse water in a suitable cesspool covered over, and at short intervals a labourer should be employed to rake out the deposit and strew it over the garden-ground: the earth will receive and absorb it with avidity. Whilst this operation is going on, doors and windows can be shut for a short time, and the smell arising therefrom will soon be dissipated. It should be observed that the soil from the water-closet decomposes in a liquid form and amalgamates with the refuse water, and becomes one common consistent and rich refresher for the growth of vegetables and flowers.†

* In my perambulations in Ireland 25 years ago, I observed the mode pursued in that country of manuring the soil with lime, and the absence of those many internal diseases in the people so common in England, to the great advantage of quack doctors.

† In Paris, Mr. Rammell states, in his Report to the General Board of Health,—

“ There are several Companies in Paris—in all, eight—which undertake the extraction and removal of the contents of cesspools; they are termed *Compagnies de Vidanges*. That known as the *Compagnie Richer* is the most important of them, doing more than half the entire work. The capital invested in the working stock of this Company is, as I am informed, upwards of £ 200,000 sterling. Their *service* requires, at the present rate of business, the labour of 350 horses, and the use of 120 vehicles of various descriptions. Their principal establishment is at Montfaucon, adjoining the *Voirie*, the spot upon which the night-soil of Paris has for ages been deposited. M. Heloin, the Managing Director of this Company, with much courtesy, gave me full explanations as to their mode of working; and as it does not differ in any material particular from that generally pursued, I shall confine myself, in the following details, to what I observed, or was informed of, in this establishment.

“ The mode of emptying the excavated or fixed cesspools adopted by this Company, and indeed universally in Paris, is to pump their contents into closed carts for transport. This operation is performed with two descriptions of pumps, one working on what may be called the hydraulic principle, the other on the pneumatic. In the former the valves are placed in

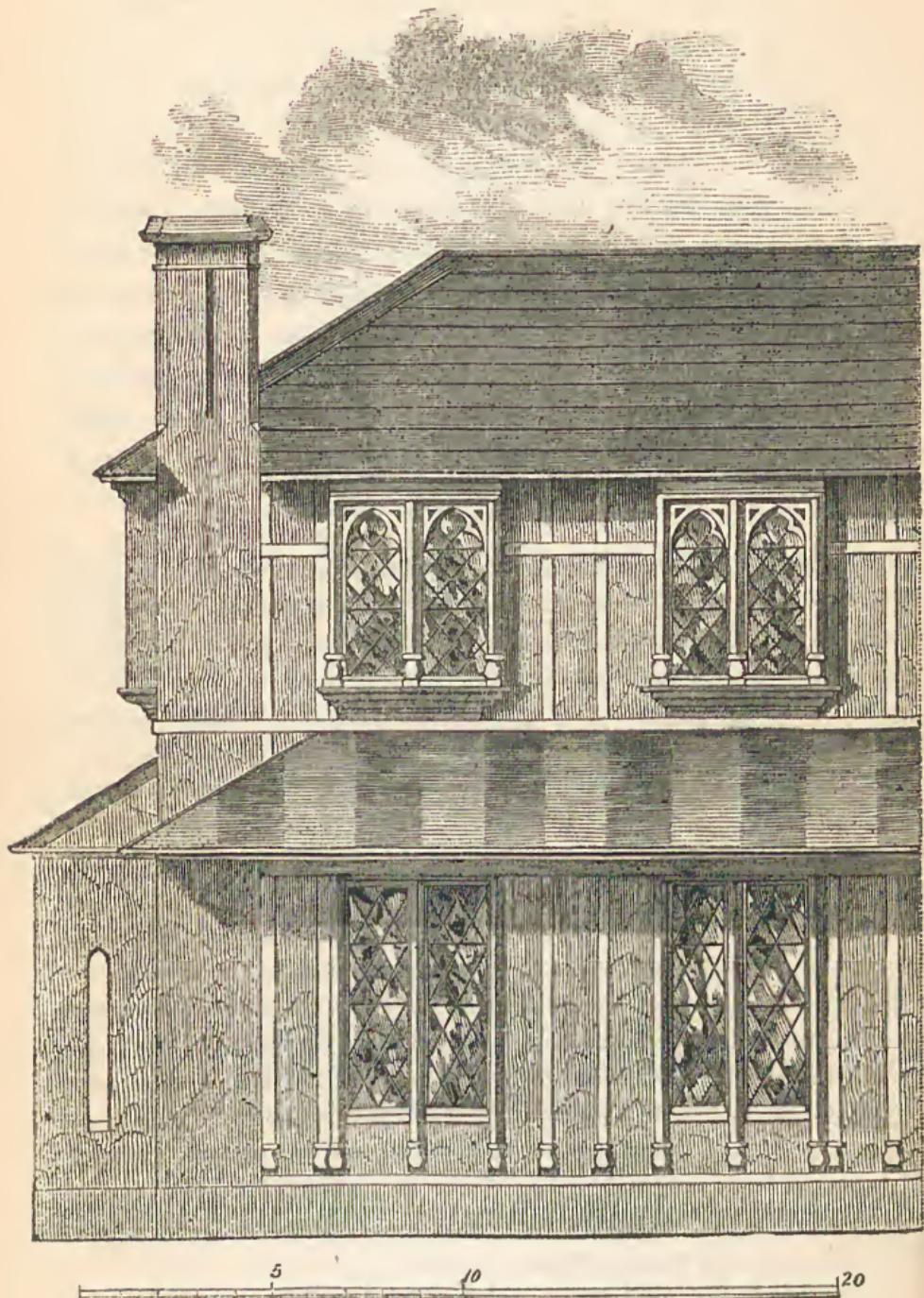


Plate V. o. Elevation.

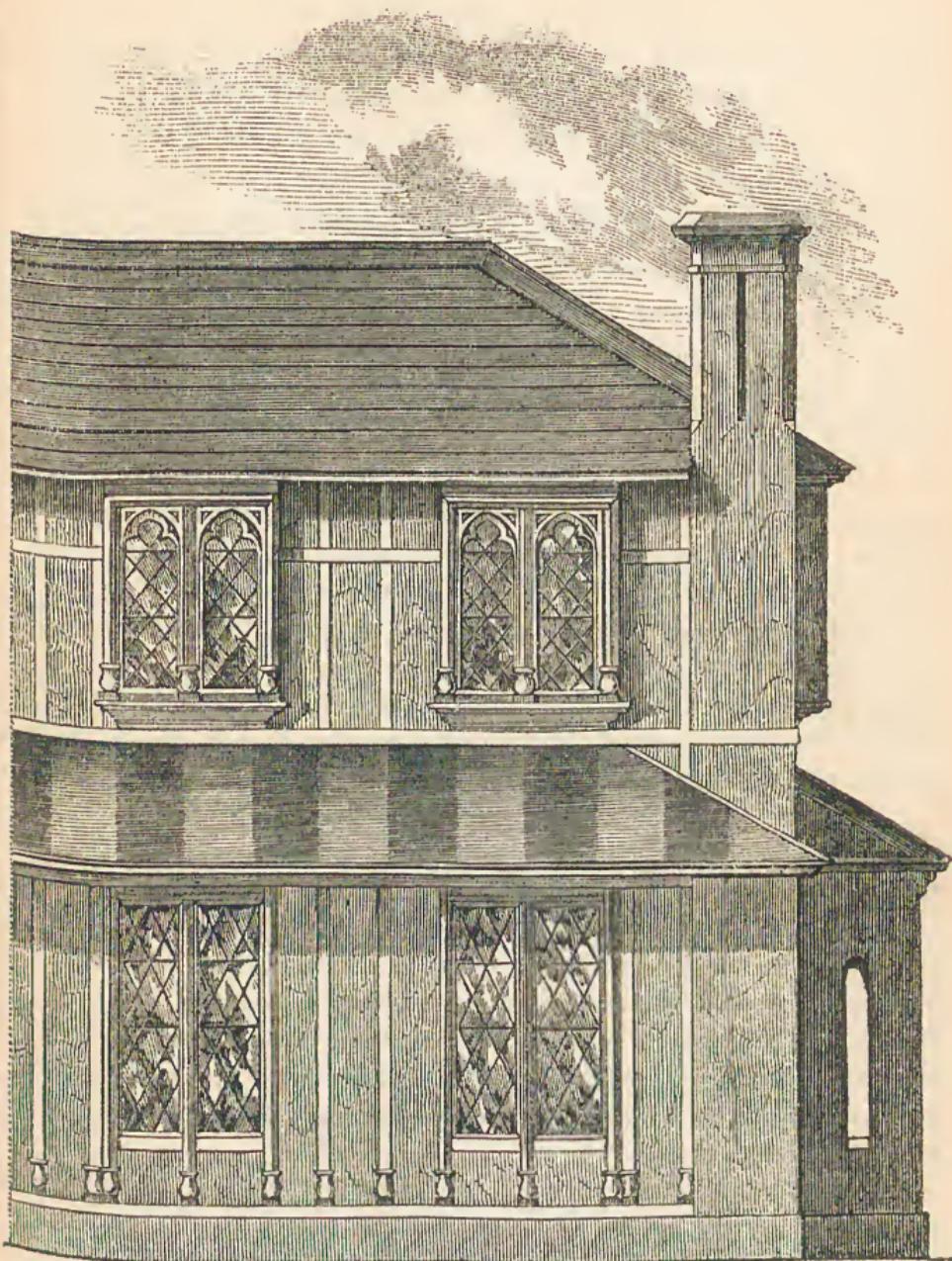


Plate VI. o. Elevation.

It will be seen by reference to Plates I. II. III. IV. VII. and VIII. that some consideration has been given to the comfort of placing the water-closet on the staircase, and keeping the closet perfectly free from offensive smells by the direction of the constant water supply from the tank, which is designed to be on the roof, (see fig. I., Plate X.) communicating with the water-closet by a pipe, to clear off the soil immediately on each occasion to the covered cesspool. It is a most desirable convenience to have the water-closet near the bed-chamber: persons unwell from colds, or suddenly seized in the night, are very susceptible of additional ailments by being exposed, as in older times, to leave the house for such a conve-

the pipe communicating between the cesspool and the cart, and the matter itself is pumped. In the latter the valves are placed beyond the cart, and the air being pumped out of the cart, the matter flows into it to fill up the vacuum so occasioned. The real principle is of course the same in both cases, the matter being forced up by atmospheric pressure. One advantage of the pneumatic system is, that there are no valves to impede the free passage of matter through the suction pipe; another, that it permits the use of a pipe of larger diameter.

“The cart employed for the pneumatic system consists of an iron cylinder, mounted sometimes upon four, but generally upon two wheels, the latter arrangement being found to be the more convenient. Previous to use at the cesspool, the carts are drawn to a branch establishment, situated just within the Barrière du Combat, where they are exhausted of air with an air-pump worked by steam power. A 12-horse engine erected here is capable of exhausting five carts at the same time; the vacuum produced being equal to 28½ inches (72 centimètres) of mercury. A cart in good repair, and upon two wheels, will preserve a practical vacuum for 48 hours after exhaustion.

“The usual capacity of both descriptions of cart is 2000 litres, the largest size allowed by the police regulations, and the total weight, when full, about 3 tons 8 cwt. Three horses are employed to draw it.”

It will be seen that the soil thus obtained is a source of profit. Why is not this system applicable in London and its neighbourhood? It would prevent a vast deal of evil, and be most praiseworthy on the part of parish authorities to unite and clear away the noxious gatherings, and derive a profit on the same for easing the ratepayer and improving his health. What are the projectors of Public Companies about?

nience in the yard or garden. It was no uncommon thing (and is still, I fear) to find only one commode for half-a-dozen houses. Just for a moment imagine one taken ill in the middle of the night, and having to turn out of a warm bed into an open yard, exposed to cold, rain, and wind: the most robust would thus become a fit subject for a medical attendant. This improving age has led to a better state of things, and added much to the years of a man's life.

Dr. Arnott's simple and inexpensive mode of ventilation ought to be applied in every living-room of a house: a circular-formed aperture is the most desirable when placed in rooms having fire-places: the ventilator should be over the chimney-piece, about 6 inches from the ceiling; and in the rooms that have no chimneys it should be placed on that side of the room nearest to the passage or staircase; (the staircase, as will be seen in Plate X., being well lighted from above.) In cold weather it might be desirable to have a neat green-baized door at the bottom of the stairs in the passage of the house, not shown in the Plans I. or II., to keep off the cold air, and, when not needed, it could be fastened back by a hook. The cost would be under 20s.

The reader is referred to an old but a very valuable work, entitled 'The Villas of the Ancients,' illustrated by Robert Castell, folio, 1728, from which the following extracts are made, as applicable to this subject. "The natural good qualities of a situation mentioned by Palladius are—a salutary air, plenty of wholesome water, a fruitful soil, and a commodious place;" and in another passage he thus gives directions how to judge of the goodness of air and water. "We may conclude those places wholesome that are not deep valleys, nor subject to thick clouds; where the inhabitants are of a fresh complexion, clear head, good sight, quick hearing, and a free distinct speech: by these means is the goodness of the air distinguished, but the contrary appearance proclaims that climate to be noxious. The unwholesomeness of water may be thus discovered: in the first place, it must not be conveyed from ditches or fens,

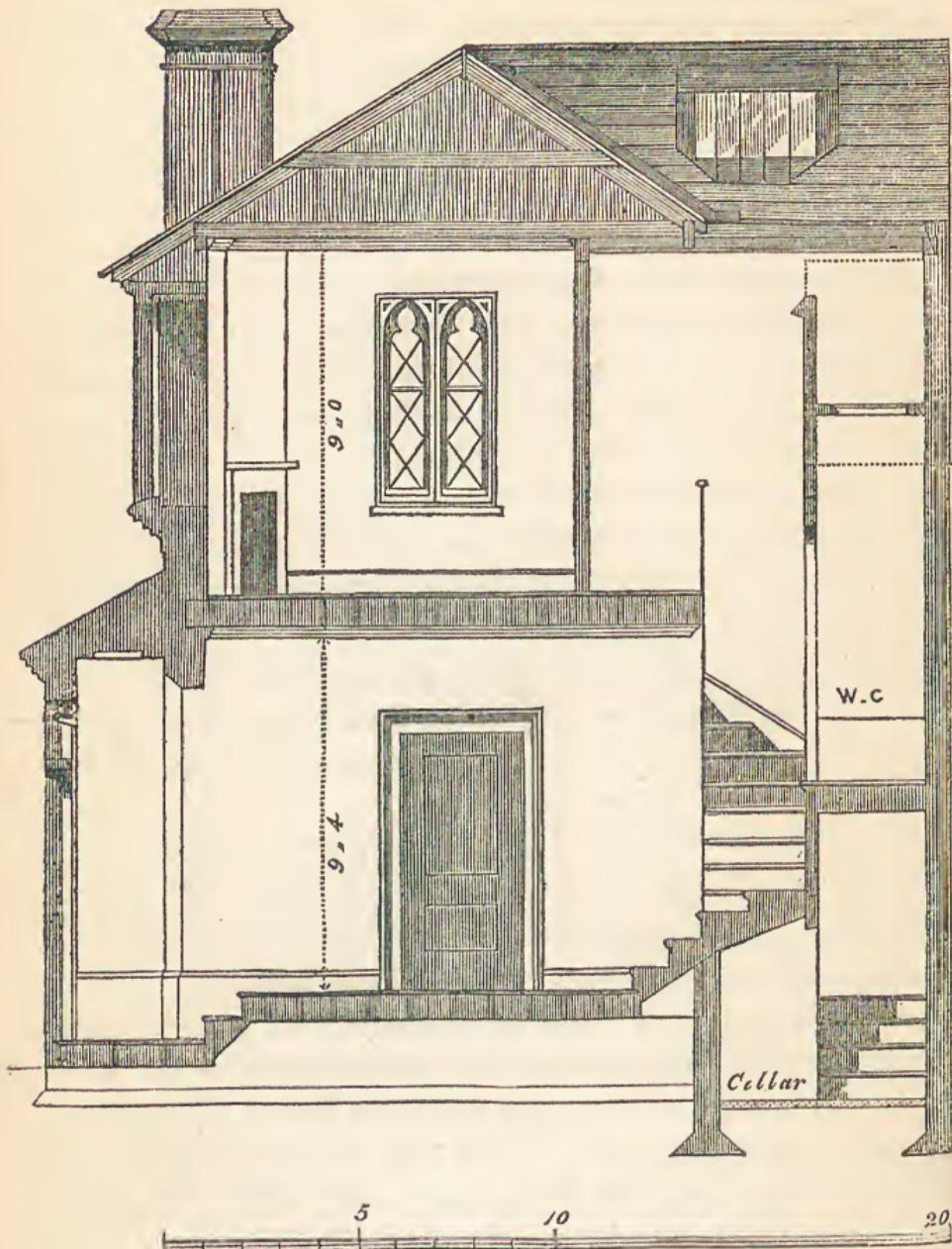


Plate VII. Section.

W. C. Water-closet.

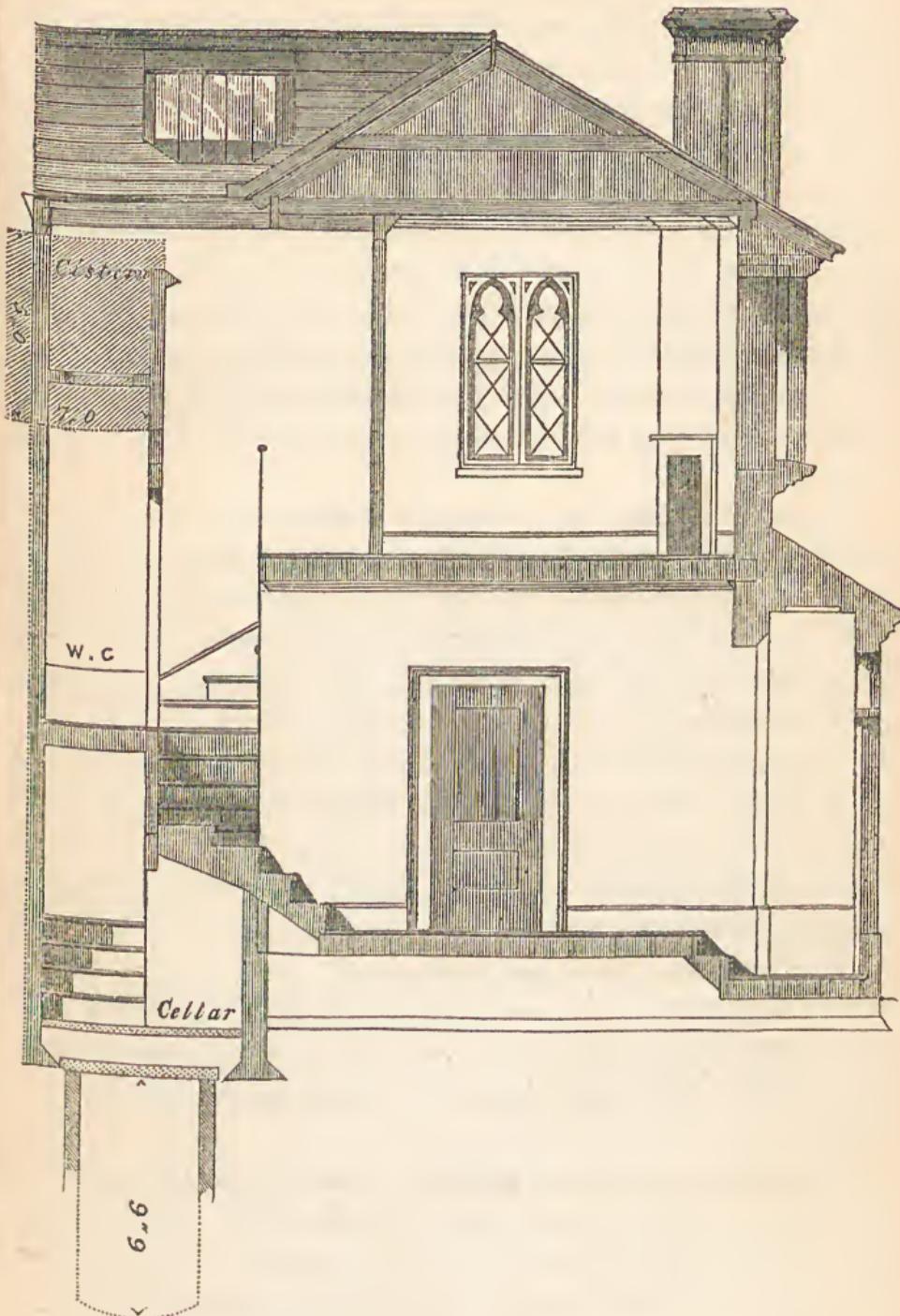


Plate VIII. Section.

w. c. Water-closet.

nor rise from minerals, but be very transparent, not tainted either in taste or smell, without settlement, in winter warm, in summer cold; but because nature often conceals a more lurking mischief in these outward appearances, we may judge whether water is good by the health of the inhabitants: if their cheeks are clear, their heads sound, and little or no decay in their lungs and breasts;—(for generally when the distempers in the upper part of the body are transmitted down to the lower, as from the head to the lungs or stomach, then the air is infectious; besides, if the belly, bowels, sides, or reins are not afflicted with aches or tumours);—if these, or the like, are apparently in the major part of the inhabitants, there is no cause to suspect the unwholesomeness of the air or water.”

—p. 56.

Again, “If there is no running stream, some well-water must be found out in the neighbourhood, not deep, nor of a bitter or brackish taste. Should these conveniences likewise fail, and there is a great scarcity of running water, large cisterns must be made * * * to hold the rain-water, which is most wholesome; but that is esteemed best which is conveyed by earthen pipes into a covered cistern. * * * * Rain-water is generally esteemed wholesome, because it washes off the noisomeness of the poisonous water.”—(pp. 58, 59.) “The fronts of all buildings should be placed conformable to the climate; in cold countries (where there is seldom any inconveniences arising from too much heat), the principal part should be turned to the south; and in buildings placed in a southern latitude, where the sun may have sometimes too great power, the front should be turned to the north.”—p. 18.

The drawings engraved as Plates I. to X. were made from my ideas, and practically carried out by Mr. Gifford, Architect, No. 10, Bloomfield Place, Pimlico, who has had much practice in designing and building cottages and villas: the specification also was made by him, in accordance with the given amount of the estimated cost.

DESCRIPTIVE SPECIFICATION

OF TILE

WORKS NECESSARY TO BE PERFORMED IN THE ERECTION OF
RURAL DWELLINGS FOR TRADESMEN AND PERSONS OF
LIMITED INCOMES.—(SEE PLATES I. TO X.)

Excavator— Excavate to the required depth all the trenches for the footings, and concrete if necessary. Sink and Stein the cesspools to a sufficient depth 8 courses from top downwards in cement, bed down a 6" York slab on top with 12" of clay rammed down on it, and level for paving of cellars; sink and Stein the well, and dome the top in cement.

Bricklayer— All the brickwork to be of hard-burnt stocks and good lime mortar in proper proportions of sharp sand: the footings to be 2 courses in 2 bricks; external walls 14 inches to chamber-floor plates and 9 inches to the roof plates. All the fronts to have close flat joints, and not to exceed 12 inches to 4 courses in height, with arches to window and door openings in cement. To have 4" cross walls with footings for sleepers under the ground floor, as may be directed; to bed all plates and lintels, and the partitions to be brick-nogged; ram in hard the earth to the foundations; point in door-cases and window-frames, and parget the flues.

Carpenter— All the timber to be of clean Memel, free from knots or sap; the sleepers under the floors

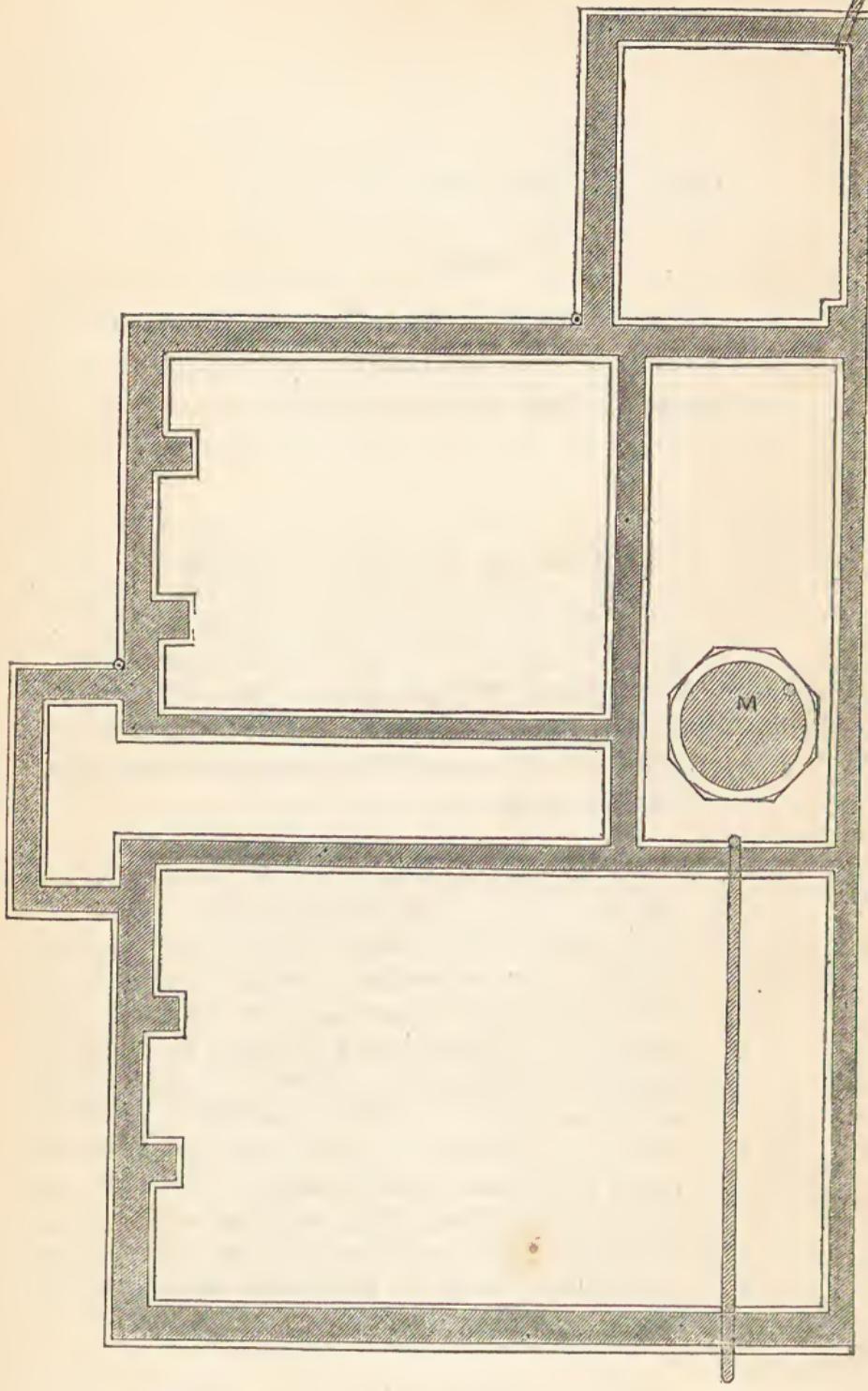


Plate IX. Plan of Footings, &c.

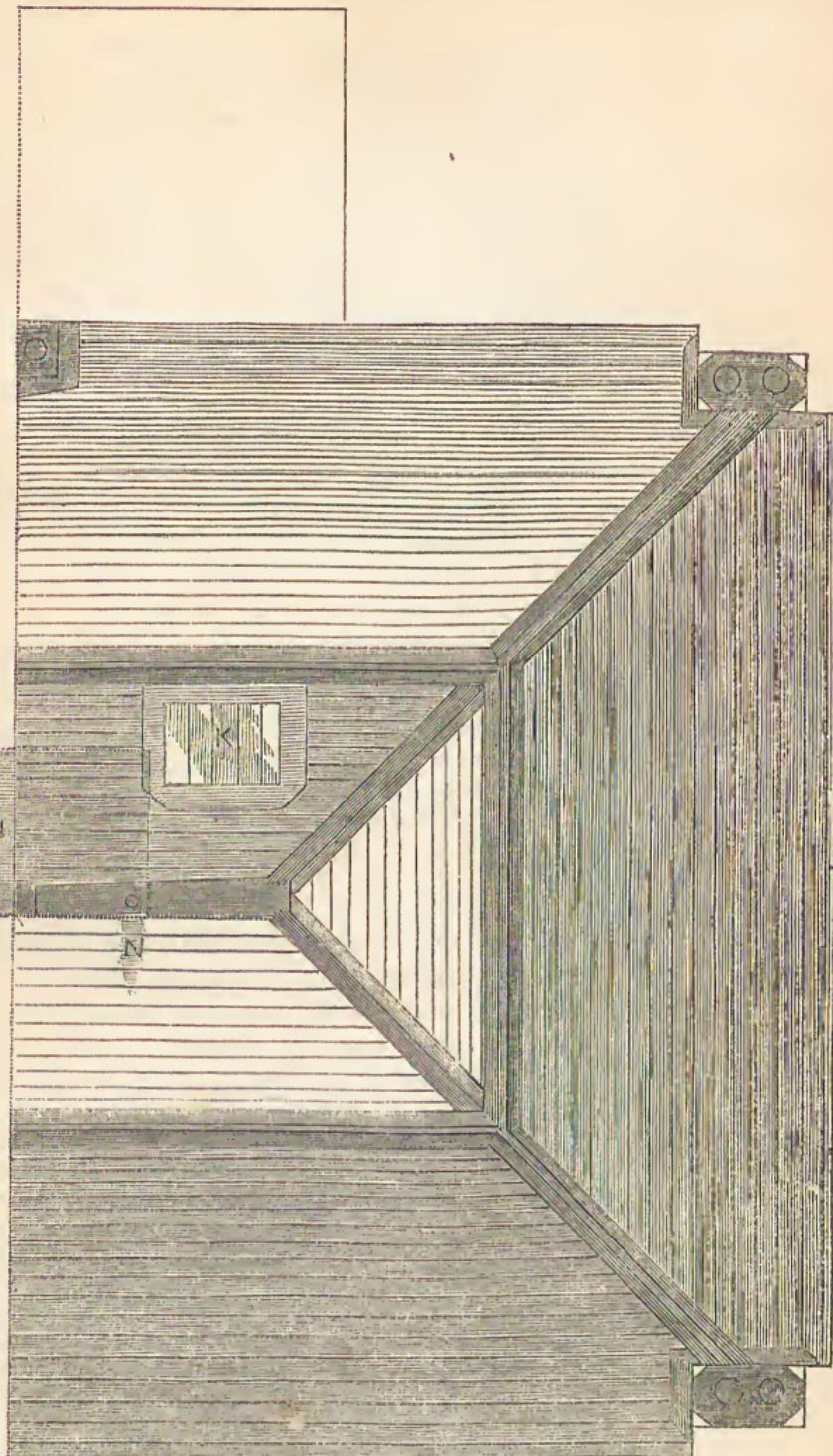


Plate X. Plan of Roofs.

- i. Large cistern to supply water-closets and bed-rooms.
- k. Top light over stairs and water-closet.
- l. Wells to supply two cottages. m. Cesspools.
- n. Two sufficient wastes to relieve the cistern.

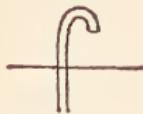
Carpenter— to be of seasoned oak, lapped and spiked at angles; the roofs to be framed in the manner described in the sections, with plates, binders, and ceiling-joists, collar-pieces, hips, ridges, gutters, and bearers in the hoppers, and trim for skylights, $\frac{3}{4}$ " boarding for slates: the partitions to be properly braced, and all the work to be done in a good and workmanlike manner: prepare a strong framed cistern lined with $1\frac{1}{2}$ " deal of size described in drawings.

SCANTLING OF TIMBER.

Oak sleepers	4"	\times	3"
Floor-joists on ditto	7"	\times	2"
Chamber-floor joists	$8\frac{1}{2}$ "	\times	2"
Quartering	$3\frac{1}{2}$ "	\times	3"
Partition-heads under ceilings			
of roofs	$4\frac{1}{2}$ "	\times	3"
Wall-plates	$4\frac{1}{2}$ "	\times	$2\frac{1}{2}$ "
Lintels	4"	\times	3"
Rafters	7"	\times	2"
Hips	9"	\times	2"
Ridges	$10\frac{1}{2}$ "	\times	$1\frac{3}{4}$ "
Gutters and bearers			
			$1\frac{1}{4}$ "

Joiner— Lay inch yellow deal folding floors throughout, $1\frac{1}{4}$ " moulded steps, risers, and brackets, on strong carriages; 1" framed grounds to all doors, 6" wide, with mitred ogee mouldings and rebated and beaded linings; $1\frac{1}{2}$ " four-panel doors; those in the chamber floor and offices square-framed, and moulded two sides in passage and parlour; 7" square skirtings in bed-rooms and offices, and 9" moulded ditto in passage, stairs, and parlour; all the closets to have shelves and 1" square-framed doors. The outer doors to be $1\frac{1}{2}$ " six-panelled bead, flush and square, in strong rebated and beaded door-cases mortised into rubbed York steps. The window-frames, in accordance with drawings, to be provided with saddle-bars and quarry-lights in lead, with casements in each window. The tile-lapped skylights to be prepared to open for ventilation and approach to roof and cisterns. To have $\frac{3}{4}$ " beaded lining and inch rebated and

Joiner —— clamped folding struts to ground-floor windows; to the stairs a turned newel-moulded handrail and square balusters. The water-closets to have seats, risers, and bearers, with 1" clamped flap, and 6" wide $\frac{3}{4}$ " beaded skirting, with a top light, and 3" ventilating pipe to the roof, turned down above, as in the annexed figure.



Mason —— Provide and fix York sink in wash-houses, York steps to outer doors and sills to windows, and set or fix the same complete; pave the cellars, the wash-house, and the level outside the kitchen with $2\frac{1}{2}$ " square York, and down to cellar to have square York steps.

Plasterer —— All the ceilings and strings to be lathed, with two coats of plaster, set and white; the partitions lath, plaster 2 coats, and set for paper, and the walls rendered 2 coats and set; the kitchen coloured, and offices lime-white; the ground floor to be pugged on laths and fillets between the floor-joists; to have a plain moulded cornice in the parlour of 9" girt, and passage and lobby 6" girt.

Plumber —— Lay the hips, ridges, and valleys with lead of 6 lbs. to the foot superficial, the gutters with 7 lbs.; line the cistern with the same, and provide waste-pipes as described in drawings; provide and fix apparatus of water-closets as may be directed, and also a pump with the requisite appendages, &c. &c.

Slater —— Slate the whole of the roofs with Countess slates, double eaves, copper nails, 2 to each slate; to have proper tilting-pieces.

Painter & Glazier All the glass to be 2nd crown without colour; prime, knot, and paint all internal wood-work

Painter, &c.—3 times common colour, and outside wood and iron work 4 times common colour.

Smith ——— Provide and hang all casements, shutter-bars, and fastenings, as may be directed.

Ironmonger ——— Provide all hinges, good locks, keys, bolts, and fastenings required.

REFERENCE TO THE LETTERS ON THE PLANS.

Ground floor.

- A. Larders outside kitchen windows.
- B. Dressers.
- C. Closets with shelves.
- D. Wash-houses, pumps, sinks, and coppers.
- E. Closets.

Chamber floor.

- F. Closets under cisterns.
- G. Bed-Rooms.
- H. Closets.

- I. Large cistern to supply water-closet and bed-rooms.
- K. Top light over stairs and water-closet.
- L. Wells to supply two cottages, in plan of footings.
- M. Cesspools, in ditto.
- N. Two sufficient wastes to relieve the cistern.
- O. Elevations, to a small scale, of three double cottages, in accordance with the plans.
- P. Ditto, ditto, of a different style. (See *Frontispiece.*)

The estimated cost, at the London prices, is for each double cottage about £380.

HUGHES, PRINTER,
KING'S HEAD COURT, GOUGH SQUARE.

Digitized by:



ASSOCIATION
FOR
PRESERVATION
TECHNOLOGY,
INTERNATIONAL
www.apti.org
Australasia Chapter

**BUILDING
TECHNOLOGY
HERITAGE
LIBRARY**

<https://archive.org/details/buildingtechnologyheritagelibrary>

from the collection of:

Miles Lewis, Melbourne

funding provided by:

the Vera Moore Foundation, Australia

